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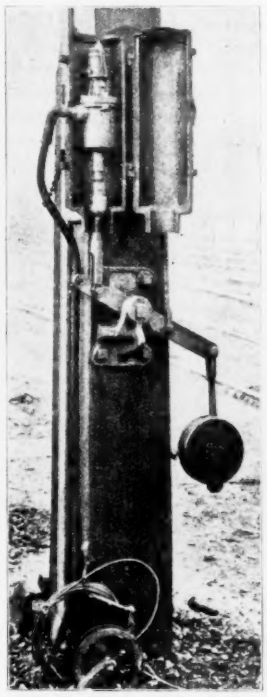
SIGNALLING ON AMERICAN RAILWAYS

A DESCRIPTION OF SOME OF THE DEVICES WHICH ARE NOW GENERALLY EMPLOYED FOR PROTECTING THE LIVES OF PASSENGERS



ELECTRO-PNEUMATIC EQUIPMENT FOR OPERATING SIGNALS.

A RAILROAD disaster "just around a curve," or as the result of a burning bridge will soon be events of the past. The iron and steel bridges have replaced the flimsy, oil-soaked and sun-baked wooden structures of a generation ago, and the latest systems of signalling devices on the progressive railway lines have reduced the danger from collision to a minimum. There may still be an error of human judgment, but even the possibility of this may in time be eliminated by an electric current so pervasive that an engine will be reversed without the hand of the engineer when it approaches danger. But this is for the future to test.

At the present time there are three systems of signalling devices in general use, the electro-pneumatic, pneumatic alone, and electricity alone. If you were near a great center of trade you could enter a signal cabin and find all the mechanism for handling thousands of trains every day. For example, at the great union depot in Boston, where 4,000 trains are dealt with in the twenty-four hours, one electro-pneumatic box, equipped with 127 handlers and tenanted by one signalman at a time, does the whole work.

A description of this electro-pneumatic system cannot fail to be of general interest, since it contributes so much to the safety of the majority who travel. The electro-pneumatic box, to which we have just referred in Boston, is in shape not unlike that of a semi-grand piano bereft of its top cover, 10 ft. 8 in. long, and standing about 3 ft. from the floor. In front of the apparatus is a rank of small handles 6 inches long, which can be turned forwards and backwards with as much ease as the keys of a piano can be depressed. The movement of each of these handles applies electricity for the purpose of actuating a pneumatic valve, and the latter, in turn, controls the supply of air to the air-motor, which performs the actual task of releasing a signal or pulling over a switch as the case may be. Each signal post and switch is equipped with a motor. All this, of course, does away with direct mechanical connection by rodding and wire, according to the old process, and also the heavy physical labor involved by pulling over a stiff lever every few seconds. On examining the keyboard closer we notice some handles are painted red and work semaphore arms, while others are black and manipulate switches. Every handle is provided with a small button, and the latter must be pressed before the handle itself can be moved; it is, in fact, a catch compelling the handle to perform its full stroke, and securing it firmly in either the "on" or "off" position. In the case of a handle operating a signal the full stroke can be made at once; but on reversing the action to set the signal back to "danger," there are two distinct motions, for the handle automatically pauses half way, until the electric current has sent a message back announcing that the arm has returned to "danger," the object being to guard against other handles being unlocked too soon. Again, each signal handle is made to move in the same direction as that in which the train it

THE CREWE ELECTRIC SWITCHBOARD.

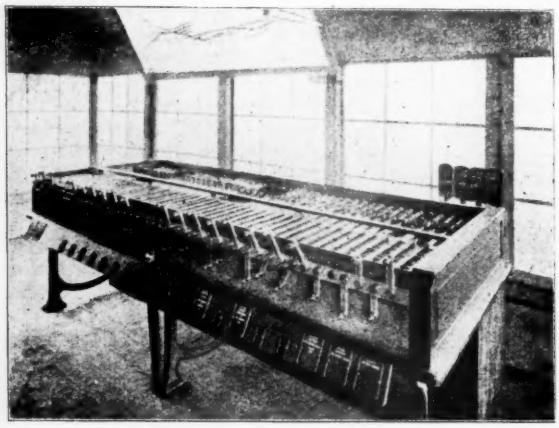
signals is traveling. The point handles stop half way both in the forward and backward motions, which enables them to notify the operator by refusing to complete the revolution, of the presence of any obstruction, such as gravel or stone, which may have got between the steel tongues of the switch, and would thus prevent them locking tight to the rails.

For performing the work compressed air is used and supplied to the various motors by means of branch pipes of ¾ inch diameter. The mechanism will act at a pressure of 55 lbs, and the highest pressure is 75 lbs. Concerning the motors, those for working the signals are the simpler of the two. In the case of a switch motor, compressed air admitted to one side or other of the piston moves the switch to and fro; while in the case of a

signal motor, the air is admitted to only one side of the piston, for the purpose of releasing the arm, the later being returned to its normal position by a counterweight, and not by air acting on the opposite side of the piston.

Electro-pneumatic signalling is the invention of Mr. Westinghouse, of the world-famous brake and electric traction firm.

Pneumatic, or as it is commonly termed, "low pressure," signalling, is different from electro-pneumatic in this respect, that in one case the pressure is brought into play by electricity, while in the other the pressure is brought to bear directly. In the electro-pneumatic a high pressure of about 70 lb. per square inch is ordinarily used, in the latter the pressure is normally 15 lb., and when not in use all operating and indicating pipes are subject to atmospheric pressure alone. With the pneumatic interlocking apparatus the keyboard consists of a closely packed row of small handles. When the signal man pulls over a handle he admits a pressure of 7 lb. per square inch into the ½-inch pipe connected with the semaphore or switch. Away rushes this pressure to the point of operation, where, instead of actuating a motor, as in the former system, it opens a valve, termed a "relay." This sets free compressed air under the pressure of 15 lb., which is sufficient to move the piston which lowers the signal or opens the switch, as the case may be. A signal is held in the "off" position, that is, it is lowered, by continued pressure of air in the



THE ELECTRO-PNEUMATIC SWITCHBOARD.

pipe leading from the cabin to the signal-post. Absence or failure of power will always leave the arm in the "danger" position by force of gravity, and thus be on the side of safety.

A very important refinement, however, is, that only one-half of the stroke of the lever itself is made by the signalman, for the second portion is automatically effected by the return indication, which shows that the semaphore or switch has attained the desired position, while until this indication is received no levers actuating signals or switches contradicting that particular movement can be worked. The practical result of this is that the signalman is relieved of the necessity of hurrying. So delicate also is the mechanism, that in the event of a small pebble preventing the switch locking tight to the rail the completion of the movement will not be made. There is with this system no possibility of trouble from condensation of moisture in pipes and the annoyances from leaks, to which a high-pressure apparatus is always more or less liable. Signalling outside of cities is known as the "Block System" of which the Hall Block Signal Co. is the promoter. The line is equipped with automatic "replacers," meaning that the passage of a train automatically puts those signals back to "danger." The automatic replacer consists of a track circuit between a battery at one end and a relay at the other; the battery being placed in the signal cabin. The electric current between the two passes through the rails, which are insulated at each end of the section and bonded together. When the train enters the section the train short-circuits the track battery—that is to say, the current, instead of going through the rails, goes through the wheels of the train, thereby causing the relay coils to be de-energized and opening the magnet circuit at these points. The opening of the magnet circuit makes an electro-pneumatic valve to drop, the dropping of which valve shuts off the air pressure from the diaphragm of a "cut-off" valve, permitting, at the same time, this "cut-off" to open and send back the low-pressure air to a replacer cylinder. The latter throws back the lever on the interlocking apparatus halfway, and the ordinary automatic indication completes the stroke. Thus it is the lever which automatically replaces the signal to "danger," and this is the only automatic replacing apparatus which effects its purpose in this peculiarly safe manner. Owing to the comparative weakness of the electrical power utilized no stray current can affect the mechanism.

The advantages common to the electro-pneumatic and low-pressure pneumatic systems are very considerable, and may be enumerated as follows: First, there is the increased efficiency possessed by the apparatus where reliability and simplicity of working are concerned, while there is very little wear and tear of the mechanism itself. Second, there is the saving of time; for, between the movement made on the key-board and that of the most distant switch or semaphore operated, barely two seconds elapse.

The pneumatic or low pressure system is exemplified at the junction in Buffalo, N. Y., where the number of trains is 1,200. One pneumatic box, equipped with 51 levers and served by one man is sufficient.

The third and last system which has been introduced is an electric switch and signal apparatus. It is known as the "Crewe system." The apparatus is the outcome of extensive experiments by the London and Northwestern Railway Company in England, and was installed in January, 1898. The photograph showing the interior of a signal cabin containing 59 levers already demonstrates the compactness of the frame. The ordinary mechanical levers are retained in miniature, thus the old-time signal man of levers has nothing new to learn in the way of movements or catches. The levers are arranged in two tiers, the upper tier being used for switch movements and the lower tier for signal movements. Each switch and signal is provided with its own electrical main, and, in case of failure, one switch or one signal alone is affected by this system. The switch movement is an electro-motor, worked by a current of about 20 amperes at 100 volts, the mechanical parts working in a bath of black oil; the connections with the lever in the cabin are six wires, made up in a single cable about three-quarters of an inch in diameter, which is laid down in a groove in a wood casing. A check-lock is provided, to prevent the signalman from completing the movement of a switch lever, or moving the signal levers in connection, unless the switches themselves are accurately in position and locked; and, in addition, each switch is fitted with signal detectors, so that in the event of the failure of the first refinement, the signal cannot be pulled off if the switches are not in place. The cast-iron boxes containing the switch motor and the signal detectors are level with the ballast, so that they too present no obstacle.

The semaphore signals are worked by an electro-magnet, the connections with the lever in the cabin consisting of two wires —one, however, being a common return for several signals. By the "Crewe system" switches and signals can be worked at any distance.

There can be no doubt as to electrical power being eminently suited for the work. On the other hand, all methods of electrical power signalling are liable—unless the contingency is most carefully provided against—to be interfered with by stray currents in and near railroad yards. The remaining advantages of the "Crewe system" are mainly a repetition of those already enumerated as pertaining to the Electro-Pneumatic and Pneumatic. It reduces the size of signal cabins and the number of men required to work a cabin; it relieves the signalman of strain and labor; while no difficulty is experienced in "leading out" of a signal cabin in a crowded permanent way. Again, great care has been taken that no part of the apparatus is above the ballast, so that no obstruction dangerous to railway servants exists.

A NEW METHOD OF CLEANING HOUSE

THE vacuum pump for cleaning carpets, rugs, upholstering and other dust-absorbing material will shortly be introduced into general use as soon as its merits are more generally made known. The apparatus is described in a word as follows: "The vacuum cleaning machine is composed of a motor that runs an exhaust-pump, of a condensing filter that collects the dust, and of a flexible tube having an aspirating nozle, whose form varies with the pieces to be treated. The whole is carried on a four-wheeled cart and is easily transportable.

"The essential part is the condenser, which is a closed chest containing a metallic mushroom-shaped piece against which the air is projected and leaves its coarsest particles. It is then filtered through a double linen bag and is not discharged into the atmosphere till it has been relieved of all its suspended dust."

RAILROAD AND WHOLESALE DISTRICT OF KANSAS CITY UNDER WATER. TO THE RIGHT IS THE UNION STATION WITH WATER UP TO THE SECOND STORY.
—*From Harper's Weekly.*

DEVASTATION FROM FLOODS IN THE WEST

THE floods in the West have made the past month one long to be remembered by thousands of people who were left homeless and by hundreds who lost relatives and friends in the raging waters. The beginning of the inundation appeared in North Topeka, where the Kansas River overflowed its banks. Houses were swept away and probably fifty lives were lost, though the exact number will be difficult to ascertain for some time. From Topeka the flood moved on and added to the already swollen Missouri. The next point to feel the force of the angry waters was Kansas City. A full third of Kansas City is subject to floods from the joined rivers above the city, and in 1843, 1862, and in 1881 devastation followed abnormal rises. In the earlier years, however, the amount of property destroyed and lives endangered were as one to twenty compared with the present calamity.

Kansas City lost sixteen of the seventeen bridges over the Kaw. The most appalling of the stories of the bridges carried away was that of the Union Pacific Railway bridge. It stood parallel and within a few feet of the Missouri Pacific bridge. It carried twenty-seven men with it when it fell. They were carried down by the flood and the wreckage. The Missouri Pacific bridge was weighted down by eight locomotives and remained standing.

The river carried with it a wide and remarkable assortment of debris and flotsam. All sorts of household furniture and utensils floated by in the current, and now and then a house would come bobbing along tipped from side to side by the eddies and whirlpools.

Across the river bed three huge, red, square-shouldered brick structures stood wholly surrounded by water. They were the packing houses of the Schwarzschild & Sulzberger Co., the Cudahy Company and the Swift Company. These, before the flood, stood upon the west bank of the river. Beyond them was the city of Armourdale, now a deserted city with canals of deep water where its streets were. Shawnee Avenue could be seen stretching away in a glistening line for miles to the westward.

Through the centre of Armourdale a swift current was running. From the bluff in Kansas City houses could be seen sweeping through the city without stop. The water was rising so rapidly that every little while a house would start from its foundations and float off through the city. Thousands of people lined the west bluffs in Kansas City and watched the spectacle of a city floating away in a flood.

The relief committee for Kansas City, after the flood had partially subsided, issued an official statement placing the number of homeless in that city and its suburbs at 23,000. The railway companies and the packing firms are the heaviest losers in property.

From Kansas City the flood tide continued to East St. Louis, where great damage was done to property and 25,000 people were rendered homeless or destitute. The vast railroad yards were indicated only by hundreds of half submerged cars and here and there locomotives only half visible. Huge grain elevators were entirely surrounded. To the south of East St. Louis beyond the railway yard area are thousands of homes, the greater number cottages owned by laborers, submerged to the eaves.

Probably fifty lives were lost and the entire property loss was estimated at $3,000,000.

Various causes have been suggested for the heavy rains which have resulted in this great loss of life and property. Some scientific men attribute it as largely due to the volcanic eruptions of a year ago, which filled the upper air with volcanic dust. The winds would carry it all over this district and result in a heavy rainfall. Whatever the cause the need of providing more adequately against such destruction from floods is apparent.

A REMARKABLE SURGICAL OPERATION

MUCH interest has recently been aroused in England by the strange case of a man born blind who has had his sight restored by a surgical operation. The Lancet of London contains a full description of the case, written by Dr. A. Maitland Ramsey, the surgeon by whose skill the notable task was performed. The Scientific American gives the main facts concerning the remarkable operation and the strange experiences of the man on seeing objects for the first time. The writer says:

"The patient, aged thirty years, blind from birth, was brought to the Glasgow Ophthalmic Institution on February 24, 1903. He had been allowed to run about as he pleased, no attempt to educate him having ever been made. He became, however, so familiar with the country district (a few miles from Glasgow) in which he resided that he could go about without the slightest fear; and his hearing was so acute that he knew at once if there was anything unusual on a road along which he was walking, and thus he never had any difficulty in keeping himself out of danger. As he passed along a road he could tell a wall from a hedge by the sound of the air coming through the leaves and branches of the latter. He could easily go on an errand to any house in his native village, for the resonance of his footfall—quite different in sound when he was passing a building from what it was when he was opposite an open space—enabled him, perfectly familiar as he was with his surroundings, to count the houses as he passed, and thus to turn corners and finally to stop at the one which he wanted. He distinguished different blossoms partly by touch but chiefly by smell, and by dint of asking questions he got at last to know so much about their form and color that he could arrange them in a bouquet. Occasionally he worked in the harvest field and he could bind the corn and arrange the stooks as well as any of the other laborers.

"The patient was quite unable to distinguish objects, although

he could tell day from night and could easily perceive a light and locate it accurately; he seemed to have no perception of bright colors.

"As a cataract seemed to be the only obstacle to vision Dr. Ramsay resolved to operate and extracted the lens from the right eye on March 11, and that from the left eye a week later. Both lenses were small and shriveled and the nucleus of the right was calcareous. For about ten days after the operation on the left eye the patient appeared to be quite dazed and could not realize that he was seeing. The first thing he actually perceived was the face of the house surgeon. He said that at first he did not know what it was that he saw, but that when Dr. Stewart asked him to look down, the sense of hearing guided his eye straight to the point whence the sound came, and then, recalling what he knew from having felt his own face, he realized that this must be a mouth, and that he must be looking at a face. Once he properly understood what vision meant he made very rapid progress and his extraordinary retentive memory enabled him to take full advantage of everything that he was told. He was quite ignorant of color, but learned to distinguish hues very quickly.

"He rapidly learned the letters of the alphabet and figures and he will soon be able to read and to reckon. From the very first he saw everything in its actual position, showing that the retinal inversion of a picture is interpreted psychically without any education.

"He could count accurately after he had looked at objects one by one and seemed to derive much help in his calculations by pointing with his finger. Here again he seemed to translate touch into vision and to arrive at a perception of the individual parts. He cannot take things in at a glance. He does not see the passers-by on the opposite side of the street quickly. He looks most intently and moves his head backward and forward and from side to side as if trying to get a view of them all round before he can make up his mind what he is seeing; in a room, however, he can distinguish things much more quickly. With any complex outline, however, or group of outlines, he still has considerable difficulty, though pictures are no longer to him, as they were at first, mere masses of confused color.

"He was able to estimate size and distance more readily than might have been anticipated, although he said that he felt that if he were out of doors by himself he would be 'wandered.' From the time he got out of bed after the operation he could guide himself with ease through a doorway and walk about on the level, but he had considerable difficulty in ascending a stair, because the steps seemed so high that to begin with he raised his foot much farther than was necessary and without meaning to do so went up two steps at a time. Whenever he discovered his mistake he began to pay attention to the rise of each and he has now no difficulty in estimating their height.

"When he is requested to look in any particular direction he is unable to cause the ocular muscles to do what he wishes, and the balls oscillate and one or other turns inward to such an extent that a portion of the cornea is hidden by the inner canthus. This want of control renders it very difficult to make a satisfactory ophthalmoscopic examination, but as far as can be made out the fundus oculi is normal; indeed, the functional activity of the optic nerve since the cataracts were removed is very remarkable and is in striking contrast to the purposeless muscular movements. Disuse has crippled the function of the latter, but seems to have had but little effect on the activity of the former. The eye is a receptive organ and the light that gained access to the retina through the opaque lens proved stimulus sufficient to maintain the optic nerve in health, while the want of visual power deprived the co-ordinating center in the brain of all stimulus to develop and hence the ocular muscles are not trained to obey the dictates of the will."

OCCUPATIONS OF STUDENTS DURING VACATION

VACATION time has come for a great host of college students. How they will use their time from now till September is an interesting study. In great universities there are generally committees to look after the employment of students during their spare time. At Columbia University, with its 5,400 students enrolled, there is such a committee, and it is stated by the Commercial Advertiser that fully 600 students meet their expenses largely by work secured through it. Its influence has grown and this summer the number of students who have found work through it is largely increased.

It is astonishing to observe the many avenues of employment which are open to students, and each summer brings new suggestions and new opportunities. The usual semi-educational position secured for the summer is one of combining tutoring and companionship "to give a boy a high moral tone along with intellectual advancement," as one father put it in applying for a student tutor. Such positions will bring with them this year the opportunity to travel in Europe, to spend the summer in Lower California and on the Atlantic seaboard. A recent case demands the service of a student several hours a day for an entire year to teach a deaf mute the elements of algebra, geometry and the modern languages. Waiters and cashiers for summer hotels have been engaged in numbers at Columbia, while two students who have served an apprenticeship are to manage summer hotels on the upper Jersey coast.

A teachers' agency has secured a student to give instruction in vocal music, the mandolin and the banjo, and a college man of pleasing voice and appearance is to explain the meaning of moving pictures at evening entertainments in "animated photography" before church congregations, clubs and summer hotels.

The summer resorts furnish other chances for the student in need of funds. One student has been employed as an attendant at a ping-pong table, and three others are to take charge of naphtha launches and rowboats for the guests at a neighboring hostelry. A quartet from the University Glee Club has scheduled a dozen engagements to give vocal concerts at Adirondack camps and hotels, and a freshman is to peddle writing paper in the Lake George region. A small syndicate of three upper classmen are to establish agencies in regions frequented by summer girls for candy manufacturers.

Among the other methods of earning a livelihood arranged for the summer by Columbia men are leading boy's clubs, collecting subscriptions for charitable organizations, proctoring at university summer schools, playing church organs, singing in choirs, acting as bank clerks and messengers, assisting in the manual work at yacht clubs, doing subordinate work on the engineering staffs of railroads, surveying farms and townships, and the like. Four men are to act as waiters' checkers with a steamship company, whose boats ply the great lakes, and others are to engage in newspaper work. The number of book agents this year is comparatively small, although there are some, while the students' committee reports that over forty undergraduates are to take up life insurance work in some form or other. The returns in this sphere of student employment last year were so gratifying that the officers have advised many men to take their chances at it during the coming vacation. There have been more applications for Columbia men to take charge of summer camps for boys than the university has been able to supply. The heads of at least three prominent settlement camps are to be Columbia men. These are the Educational Alliance, the Hartley House and the new Speyer Settlement camps.

The great scope of employment open to college men is shown by the fact that one engineering student has been appointed to the Interstate Sewage Commission by Governor Odell, while Sewall Truax, Charles A. Holden and Edward H. Loder, seniors in the school of engineering, have been named to accompany the United States Geological Survey Commission, which is to spend the summer in surveying the boundary between the United States and the Dominion of Canada from Montana to the Pacific coast. Harry Hull St. Clair, a graduate student in anthropology, is to live with the Indians in Oregon to learn their languages, manners and customs, and L. Hussakof, a scholar in biology, leaves very soon for Bermuda to do research work in aquatic zoology during the summer months.

A party of twenty mining engineers are to go to Montana, Colorado and western Pennsylvania for practical work. They are to live with the miners and work shoulder to shoulder with them at the bottom of the shafts for three months. The mines selected are those employing the most advanced methods of ore dressing, washing and mining, and by means of their experience these students hope to step into positions of responsibility when they complete their college course.

FREIGHTING WITH REINDEER, CAPE PRINCE OF WALES.

REINDEER AND THEIR FUTURE IN ALASKA

NEW VENTURE CROWNED WITH SUCCESS—GROWTH IN NUMBERS AND USEFULNESS

By GILBERT GROSVENOR, in the National Geographic Magazine

RIDING REINDEER IN DEEP SNOW.

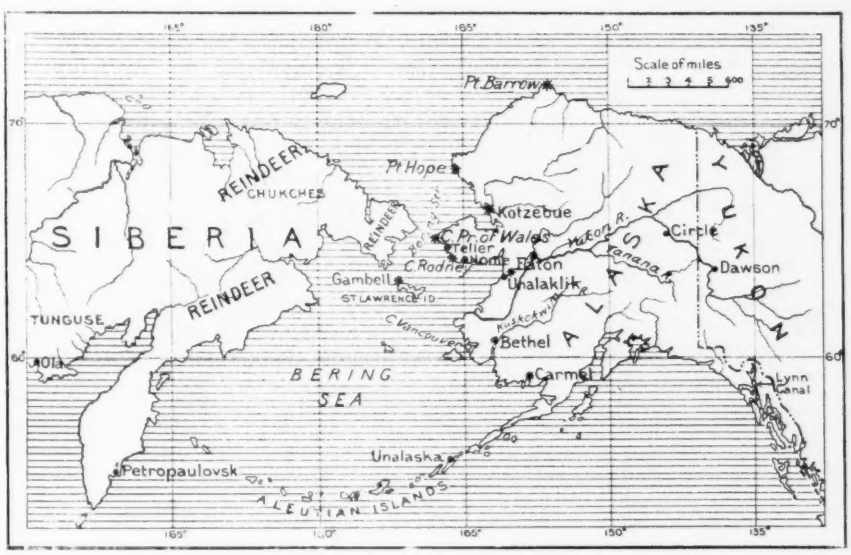
TWELVE years ago Dr. Sheldon Jackson brought his first herd from Siberia and started his reindeer colony at Unalaska, off the bleak coast of Alaska. Many then smiled at the experiment and declared his plan for stocking the great barrens of northwestern Alaska with thousands of the animals which for centuries had been indispensable to the natives of Lapland and Siberia was impracticable and wasteful of time and good money. But the experiment prospered from the very first. Other reindeer, numbering nearly 1,000 in all, during the succeeding years were brought over from Siberia. Today there are nearly 6,000 head in the various herds distributed along the Alaskan coast from Point Barrow to Bethel. The existence of the 20,000 natives of northwestern Alaska, as well as the success of the miners who are beginning to throng into the interior of the territory in the far north, are dependent upon these domestic reindeer; their clothing, their food, their transportation, their utensils, and their shelter are all furnished them by the reindeer.

The reindeer enterprise is no longer an experiment, although still in its infancy. There are 400,000 square miles of barren tundra in Alaska where no horse, cow, sheep, or goat can find pasture; but everywhere on this vast expanse of frozen land the reindeer can find the long, fibrous, white moss which is his food. There is plenty of room for 10,000,000 of these hardy animals. The time is coming when Alaska will have great reindeer ranches like the great cattle ranches of the southwest, and they will be no less profitable.

The story of the inception and growth of the reindeer enterprise in Alaska is very interesting and is not generally known. During an extended trip of inspection of the missionary stations and government schools in Alaska in the summer of 1890, Dr. Sheldon Jackson was impressed with the fact that the natives in arctic and subarctic Alaska were rapidly losing the sources of their food supply. Each year the whales were going farther and farther north, beyond the reach of the natives who had no steamships in which to pursue them; the walrus, which formerly had been seen in herds of thousands, were disappearing; the seals were becoming exterminated, and in winter the Eskimo had to tramp 15 to 20 miles out on the ice before he could catch one. The modern hunter, with his steam launches and rapid-fire guns, had found the whales, walrus, and seals such easy prey that he was ruthlessly destroying them. Also the wild caribou, that the native had easily captured before, had been frightened away and was rarely seen.

Not only was the Eskimo losing his food, but what in an arctic climate is no less important, his clothing as well. The whalebone, the ivory tusks of the walrus, the seal skin, and the oil had given him means of barter with the Siberian traders across the Strait, from whom he obtained reindeer skins to keep him warm in winter.

Dr. Jackson saw that unless something was done at once the United States would have to choose between feeding the 20,000 and more natives or letting them starve to death. The latter course was impossible; the former rather expensive, as supplies would have to be carried some 3,000 miles from Seattle. The more enterprising Siberian, living on the opposite side of the Strait under practically the same conditions of arctic cold, got along very nicely, as he had great herds of domestic reindeer to fall back upon when game was scarce. The same moss which covered so many thousands of miles of the plains of arctic Siberia was seen everywhere in Alaska. The tame reindeer of Siberia was practically the same animal as the wild caribou of Alaska, changed by being domesticated for centuries. Could not the Eskimo be made self-supporting by giving him reindeer herds of his own?



OUTLINE MAP SHOWING GOVERNMENT REINDEER STATIONS IN ALASKA.
—*From National Geographic Magazine.*

On his return to the United States, during the winter of 1891, Dr. Sheldon Jackson, in his annual report to Congress, asked for an appropriation to provide the money for importing a few deer. Congress was not convinced of the wisdom of such action, but

several private persons were so interested that they placed $2,000 at Dr. Jackson's disposal to begin the experiment; the first deer were brought over that year. It was not long, however, before the government realized the importance of the movement, and in 1894 appropriated the sum of $6,000 to continue the work. Later the appropriation was increased, and during the last several years has amounted to $25,000 annually.

The Siberians were at first unwilling to part with any of their reindeer. They were superstitious and above all afraid of competition and loss of trade across the strait. Capt. M. A. Healy, who was commissioned to purchase the deer in 1891, was obliged to sail from village to village for 1,500 miles along the Siberian coast before he found an owner willing to barter his reindeer for American goods. None would sell the deer for cash. The first deer brought over were from the Chuckches herd—a tough, hardy breed.

When one considers that raising reindeer in Alaska is simple and the profits enormous, one is surprised that as yet no one has really gone into the reindeer business, especially at Dawson, where a rich market awaits the reindeer farmer.

A fawn during the first four years costs the owner less than $1 a year. At the end of the four years it will bring at the mines from $50 to $100 for its meat, or if trained to the sled or for the pack, is easily worth $100 to $150.

Reindeer teams during the past winter carried the United States mail from Nome to Candle City on the Arctic Ocean, a distance of 260 miles. The teams had heavy loads of passengers and freight and made the distance in eight days. Dog teams would have required fifteen to twenty days for the trip.

The reindeer can travel at night as well as in the daylight, and thus during the long Arctic night when dogs are inefficient transportation is always possible with a reindeer team.

The reindeer make good packers in summer. One hundred and fifty pounds is a fair load. They also can be ridden the same as horses.

The U. S. Government loans a certain number of the reindeer to the mission stations, or to individuals who have shown their ability, reserving the right, after three or five years, of calling upon the mission station or the individual for the same number of deer as composed the original herd loaned. In 1894 the Congregational mission at Cape Prince of Wales was granted the loan of 100 deer. The mission has since paid back the loan, and now possesses in its own right one thousand head.

Of the sixty individual owners of domestic reindeer in Alaska, forty-four are Eskimo. Most of them have served a five-year apprenticeship, and having earned their deer are competent to care for them.

The reindeer is to the far north what the camel is to desert regions, the animal which God provided and adapted for the peculiar, special conditions which exist. The greater the degree of cold the better the reinder thrives.

The great mining interests of central Alaska cannot realize their fullest development until the domestic reindeer are introduced in sufficient numbers to do the work of supplying the miners with provisions and freight and giving the miner speedy communication with the outside world.

The reindeer is equally important to the prospector. Prospecting at a distance from the base of supplies is now impossible. The prospector can go only as far as the 100 pounds of provisions, blankets and tools will last, and then he must return. With ten head of reindeer, packing 100 pounds each, making half a ton of supplies, he can go for months, penetrating regions hundreds of miles distant.

Even if no more reindeer are imported from Siberia, if the present rate of increase continues, doubling every three years—and there is no reason why it should not—within less than twenty-five years there will be at least 1,000,000 domestic reindeer in Alaska. This is a conservative estimate and allows for the deer that die from natural causes and for the many that will be slaughtered for food.

CENTRE OF THE WORLD'S RUBBER-GROWING INDUSTRY

MANAOS, in the State of Amazona, Brazil, 1,200 miles up the river, has, through the investments of American capitalists in the rubber trade, become a flourishing modern city of some 40,000 inhabitants, chiefly engaged in this industry. The city is lighted by electricity, has street cars, and in the midst of jungle of luxuriant tropic growth, it is connected with the outside world by telegraph to the mouth of the river and thence by cable. Consequently any important event in rubber speculation, or condition which governs the trade, is soon learned there, and the natives, who are dominated to a great extent by labor agitators, expect a larger allowance of liquor in their pay, or more wages to buy it with.

The rubber which comes from the upper Brazil district, has threatened to become exhausted because of the great demand made upon this highest grade known by the requirements for insulation in electric service. For this reason scientists have explored all parts of the world for species of trees and plants that might supply high-grade rubber to take its place. Over 1,500 varieties have been discovered, some of them in the jungles of Africa, up the Congo, but only about twenty-five are of practical value. The Amazon district, in South America, has long supplied the markets of the world, until within the past few years its rubber forests have been laid low and in many sections will scarcely be replaced. This necessitated penetrating further and further to wilds of the upper river.

Since the persons engaged in this industry became convinced that their interest lay in preserving the forests under their control, rather than in rashly destroying them, and then moving further on, a systematic plan has been followed, where practical, to tap the rubber tree as the maple tree is tapped at a certain time of the year here, instead of cutting the tree down and taking the rubber sap from it to the last drop. In the latter method there is a larger immediate return, but it has been through this practice that the productive ancient forests of Brazil have rapidly succumbed to

A RUBBER TREE 2½ YEARS OLD.

the axe. In the vicinity of Manaos the forests are being preserved this way, as the maple groves of New England always have been, and for the best of reasons. The future of the rubber trade and of such cities as Manaos depends upon the preservation of these forests.

The sap is collected and brought to the kettles, where it is boiled down to a certain fineness. Then the product in its crude form is rolled into balls of about one and one-half to three feet in diameter, when it is placed in storehouses to follow much the same course in its journey toward the market and manufacturer as any product which need not be immediately used. Speculators hold it for the best prices that they can demand, and often, where the winter has been unseasonable in the colder portions of the civilized world, they have to carry their rubber from one to two or three years. A great deal of the crude product is always in the warehouses in New York.

Besides the demand for rubber, which is increasing all the time through the requirements of electricity, there is an increasing use of it for automobile and carriage tires. The bicycle has fallen from its maximum use of a few years ago, but the modern demand for rubber-tired vehicles of all descriptions has more than made up for this. Besides the demand for rubber hose for garden or home use has increased also in proportion as the country has prospered the past seven years. People who never had homes and lawns now water the grass where potatoes or weeds grew before. Municipalities are constantly replenishing their fire department hose, and have of late been more extravagant in this expense. Ocean cables require a good amount of the finest rubber also. About the only line in which rubber is used which has not called more heavily of late upon the supply of the product, has been that of rubber coats. The old-fashioned rubber coat has almost gone out, except for firemen and in certain lines of labor such as street-car employes, policemen, etc. In the great trade the mackintosh or mostly cloth coat has taken the old rubber coat's place.

EFFECT OF SUGGESTION ON HEALTH*

HOW THE ACTION OF THE BODILY ORGANS IS THWARTED BY COMMENTS ON DIET

By THOMSON J. HUDSON, LL.D.

IF I were called upon to name the most prolific source of suggestions averse to health, I should unhesitatingly say that it is the newspaper literature relating to diet. It is safe to say that nine-tenths of all diseases of the digestive organs, especially dyspepsia, are due primarily to the suggestions embraced in that kind of literature. The exasperating feature of it is that not one newspaper article in a hundred on that topic is written by anyone who knows anything about the subject. They are generally written by boys or young ladies who are learning the trade of newspaper writers. Everybody familiar with that class of people is aware that the highest ambition of the newspaper cub is to write something that will be extensively copied by other papers; and he soon learns that anything pertaining to health in general, or diet in particular, is sure of an extensive and eager hearing. Whereupon he proceeds to guess out a long list of articles of diet that are "unhealthy," because indigestible, innutritious, or poisonous. In order to be entirely original and startling, he generally selects one or more of the most popular articles of diet in his community, and tells his readers that they are—perhaps slowly, but "certainly surely"—sapping the foundations of their respective constitutions by indulgence in this or that particular article of diet.

One of the wise sayings of the celebrated Dr. Abernethy was that "when a man begins seriously to dissect himself, he will soon be a fit subject for the undertaker." And this is precisely what the average reader of such articles generally proceeds to do. That is to say, the next time he indulges in the article of diet inveighed against, he proceeds to institute a series of introspective observations having special reference to the behavior of his stomach in presence of that particular article of nutriment, and he is generally rewarded by finding just what he is looking for, namely, some decidedly uneasy symptoms indicative of indigestion. The next time he tries it the symptoms are more pronounced; and the third or fourth trial is generally sufficient to cause that particular dish, e. g., bread and butter, to be tabooed as utterly indigestible. Then he proceeds to lecture his family and friends on the subject of the insidious but deadly character of bread and butter; and in due time that article of food is banished from the household bill of fare.

The next newspaper article attacks some other article of diet, and with the same result, and so on through the whole bill of fare of the ordinary household; the result being one or more confirmed dyspeptics in every family. It may be thought that I am stating an extreme case. It is extreme, but very common; for this is the way dyspeptics are created in nine cases out of ten. The weakness of the stomach is often due solely to atrophy of that organ; and the atrophy is due, not to eating indigestible food, nor to habitual overtaxation of the digestive powers, but to the fact that it was not given enough to keep its powers at their maximum. It atrophies, precisely as any other organ of the body will atrophy, for the lack of a normal amount of exercise; and the only way to give it healthy exercise is to give it a normal amount of nutritious food to digest, always taking care to avoid those mental conditions which interfere with the normal action of the digestive organs. Strange as it may appear at first glance, the latter consideration is of the first importance; for there is no such thing in civilized countries as an indigestible article of human diet, provided the proper mental conditions are maintained. Conversely, there is no article of food that cannot be rendered indigestible by the induction of adverse mental conditions. The lesson is obvious and the remedy easy, but the discussion of it must be deferred for apparatus? Clearly not.

Another newspaper source of suggestions adverse to health is to be found in the tendency of the journalistic humorist to fadism in the construction of the so-called newspaper joke or humorous paragraph. A single illustration of my meaning will suffice. Many years ago some preternaturally smart newspaper cub (an Englishman, I believe) conceived the idea of conquering fame by ridiculing the New England custom—then almost universal—of eating pie (pronounced "Paie," in the vernacular) for dessert. The only thing connected with the custom—or the pie—that was a legitimate subject of raillery, even from an Englishman's dietetic standpoint, was the fact that the more luxurious of the New England pie-eaters indulged in that luxury three times a day. But the pie joke, feeble and harmless as it was in its infancy, survived and was passed around in its myriad forms, and so was the pie, until some more than ordinarily feeble-minded newspaper pathologist lifted up his voice and proclaimed the New England pie to be the real and only source of all the ills that American flesh was heir to. This, of course, was heralded far and wide as a great and an important scientific discovery in dietetics, and the usual process of "introspection" began in thousands of New England homes where pie had before been a benediction and a joy unspeakable three times a day, to say nothing of surreptitious "pieces" between meals. The usual results followed, and in an incredibly short space of time a "cloud of witnesses" arose to testify against pie. A careful watching of the "symptoms" revealed the fact that pie was "utterly indigestible." In vain it was pointed out that for hundreds of years it had been eaten by all classes and under all conditions by New England people, and that no one had discovered that pie was other than wholesome as well as palatable and easily digestible, until the newspaper fakir happened to think about it. Once started, the hue and cry went the rounds of the "family" journals, each one seeking to outdo all the others, until pie became such an abomination in the public mind that it required an abnormal development of "nerve" to defy popular opinion so far as to order a piece of pie at a public restaurant, and if anyone had the hardihood to do so he was fortunate if he escaped a serious lecture by some neighboring "reformer" on the subject of the diabolical nature of pie. Even doctors were dragged into the crusade and compelled by force of public opinion to look wise and shake their heads when a convalescing patient craved a piece of pie; and Emerson was credited by a newspaper reporter with denouncing pie as the greatest evil with which the American nation had to contend. Some doctors even went so far as to claim the credit of the discovery that pie was indigestible, and others claimed to have always known that pie was the root of all evils in the American commonwealth.

To anyone familiar with the potency of suggestion, it will not seem strange that in the midst of such a crusade against a particular article of diet there should be found many whose experience amply justified the crusade; and when we reflect that in every newspaper-reading family in the United States the subject of the indigestibility of pie was a common topic of conversation at the table, it is not at all wonderful that in almost every family one or more should experience a fit of indigestion after an indulgence followed by the inevitable "introspection," or watching for the anticipated symptoms. It would, indeed, have been a miracle on a national scale if these results had not followed, and pie had not been tabooed, as a consequence, in many an otherwise well-regulated household.

The American pie, per se, is built up of the following materials, to-wit: flour, water, lard or butter, or both, sugar, and fruit, the latter normally predominating largely as to bulk. The more epicurean tastes prevailing among the aristocratic portion of New England farmers demanded a little flavoring of nutmeg—real nutmeg, not the nutmeg of Connecticut commerce (that being manufactured solely for the export trade, as tradition informs us.)

Will some dietetic crank rise to inform us what there is among the materials themselves, or in the combination, that is unwholesome, or indigestible, or even hard to digest? Is it not, indeed, a combination devoutly to be wished for by anyone of simple tastes and normal appetite? Is there anything connected with it, suggestion excepted, that could have the remotest tendency to cause it to "disagree" with the most delicate digestive apparatus? Clearly not.

It is for this reason that I have employed the crusade against pie as an illustration of the fact that when once a suggestion adverse to any wholesome article of diet or drink is turned loose upon a community, it carries with it an incalculable amount of suffering among those who are ignorant of the subtle powers of suggestion. And I have spoken of the newspaper as the means by which such suggestions are most extensively promulgated, merely as an illustration that suggestions averse to health are numerous in a community in proportion to its facilities for the promulgation and dissemination of intelligence. It follows that so long as man rests in ignorance of the law of suggestion, the

*From "The Law of Mental Medicine," by Thomson J. Hudson, LL.D.; published by A. C. McClurg & Co., Chicago. Price $1.20 net.

higher the grade of his civilization, the more will he suffer from suggestions adverse to his health.

This leads us to the consideration of the sovereign remedy for all the manifold evils arising from the congeries of suggestions which we have been considering. Obviously the remedy is auto-suggestion; for if disease can be treated by one suggestion, it follows that it can be cured by a counter suggestion. The latter may be made by one person to another, as by a mental healer to his patient; or it may be made by the patient himself—which is known as "auto-suggestion." Other things being equal, an auto-suggestion is more potent than a suggestion from any extraneous source, for the simple reason that an auto-suggestion is generally backed by the objective convictions of the patient, whereas suggestions by another may directly contravene the patient's objective reason and experience—not that the latter may not be effective when it is made with force and persistence, but that the former are more easily and naturally effective, either as a moral or a therapeutic agency.

One may, therefore, counteract the great bulk of the current dietetic suggestions by the employment of just a little reason and common-sense. If he feels that he must read what every crank has to say about diet and health, let him ask himself if there is any reasonable foundation for the diatribe against the particular article under treatment, and in nine cases out of ten he will find that it contravenes all reason and human experience. But the safest plan is to refrain from reading such stuff; for the tendency always is to try to verify what one reads on such subjects, especially if one is ignorant of the potency of suggestion and its tendency to create expected conditions. This is on the principle that "an ounce of prevention is worth a pound of cure." It is always easy to prevent an adverse suggestion from taking effect in the mind; and that is by not allowing it to find an entrance. To that end one should never allow himself to think, much less talk, on the subject of the wholesomeness or digestibility of the food that is set before him. The good old Biblical rule is the best: "Eat what is set before you, asking no questions for conscience' sake."

Above all, having partaken of a dish, do not go away and sit down to watch for symptoms of indigestion. If one does that, he will be sure to find what he is seeking. The best rule of diet is to eat what you like to eat, in due moderation of course, and never allow the question of its digestibility to intrude itself, even in an adverse thought. Indulgence in cheerful conversation during and immediately after meals is the best conceivable "dietetical and prophylactical receipt of wholesome caution" against acute indigestion or chronic dyspepsia. In other words, keep your mind off your stomach during the process of digestion, and you will soon forget that you have a stomach. The immunity of animals and idiots from diseases of the digestive organs, many of whom eat enormously of whatever they can get, is due to the fact that they are beyond the reach of suggestion adverse to health. Someone has well said that if the current dietetic suggestions could reach the mind of an ostrich, he would soon be unable to digest a boiled potato.

WHY PUBLIC SCHOOLS SHOULD TEACH GARDENING

By H. D. HEMENWAY, Director of Hartford School of Horticulture

THE idea of having a garden connected with the school is a very old one. Gardening was practiced in some European schools many years ago and was carried on often for the purpose of increasing the salary of the teacher or for furnishing products for him. In other schools there were botanical gardens where the specimens could be studied by the pupils. The school garden movement as it exists today is of more recent origin, beginning about thirty-five years ago. The progress has been most rapid in Europe, where there are today more than one hundred thousand school gardens; France alone has more than twenty-eight thousand, and in Russia, as in several other countries, no school will be accepted by the state to receive state funds unless a garden is connected with it. In America the school garden movement is of recent origin, but it is gaining ground rapidly.

MARKING OFF THE GARDEN AT HYANNIS (MASS.) NORMAL SCHOOL.

As sixty-five per cent of our exports are products of the farm it is almost alarming to think that so few of our children know anything about them. One reason why nearly ninety per cent of the useful business men of today were brought up on the farm is because of the productive industry taught in early childhood in farm life. There is no kind of training that squares itself for all-around development like agriculture. The farmers' boys are brought up to use their hands as well as their heads, and learn quick observation and quick decision, which is of great value to them throughout their lives. The city child's garden brings his life more nearly to that of the country child than any other form of study. As an aid to nature-study there is nothing to equal it. It can be used to help in nearly every other branch of study taught in the schoolroom. The practice in measuring and marking out the gardens and in systematically planting the seed, gives the child the practical mathematics which he so much needs. Much language work can be given in connection with it; in fact, it can be correlated with nearly all the other branches, as it furnishes material for writing, painting, drawing and geography. Even business can be taught, as is done at the school gardens at the State Normal School at Hyannis, Mass., where the products of the garden are sold, the money is taken to the bank and deposited, and the children learn the method of depositing money and drawing checks. The systematic care of tools and the systematic order of doing things, and the habits of close observation and of reporting observations, acquired by the child, will form a trait which will be invaluable to him throughout life.

Where gardens have been conducted for several years, long enough to make practical tests, it is found that the boys having the garden work are thirty per cent more rapid in mental, moral and physical development than those not having gardens. The school garden tends to develop the best traits in the children, and to create in them a love for the beautiful. It gives play to all their motor activities, and shows that results follow causes, and is one of the best methods of curing them of stealing. They begin to understand something of ownership and responsibility, and look more kindly at their neighbor's products, and, as they do not wish to lose their own, that for which they have worked, the value of the product of another is more forcibly demonstrated to them. The school garden can be made especially valuable to girls, particularly those in the city, as they do not have the same liberties of the street as have boys, and are in the open air and sunshine all too little for good, strong physical development.

*The above article is an introduction by the author to his new book, "How to Make School Gardens," in which he describes the process in detail for teachers and pupils. Published by Doubleday, Page & Company, New York.

A POLITICAL PARALLEL

COINCIDENCES IN THE ATTITUDE OF GROVER CLEVELAND AND ULYSSES S. GRANT

RESPECTING A THIRD TERM

THE steadily increasing momentum of the movement in favor of a third term for ex-President Cleveland makes it timely to recall the incidents of a similar movement in behalf of General Grant in the fall and spring of 1879 and 1880. Soon after the close of his second term General Grant went abroad on a tour of the world, receiving the highest honors from all the chief rulers of the world in every country that he visited. He returned to the United States in September, 1879, landing at San Francisco. He was received there with a great demonstration of popular admiration, and started thence across the country on what proved to be a veritable triumphal march. Every city in which he stopped greeted him with tumultuous enthusiasm, with great crowds, banquets and receptions. Nothing surpassing this demonstration of popular enthusiasm has ever been witnessed in this country.

Even after he had reached his home in Galena the enthusiasm continued unabated. When he went a few weeks later to attend a reunion of the Army of the Cumberland in Chicago more than 100,000 people poured into that city from the surrounding country to greet him. Again, when late in the year he started on a tour from Chicago across Indiana, Ohio and Pennsylvania to complete the circuit of the world at Philadelphia, his biographers record that "it was the same old story in every city—in Logansport, in Indianapolis, in Columbus, in Cincinnati—one continuous blaze of boundless enthusiasm." It was then generally recognized that he was a candidate for a third term. The press of the country was absorbed in the discussion of the question, and constant efforts were made in the early part of 1880 to get an expression from him of his attitude in the matter. The most that he would say was this:

"I will neither accept nor decline an imaginary thing. I shall not gratify my enemies by declining what has not been offered me. I am not a candidate for anything, and if the Chicago convention nominates a candidate who can be elected I shall be glad. All my life I have made my decision when the time for the decision has arrived. I shall not depart from my usual course of action."

He went on a visit to Cuba and Mexico in March, and from the Mexican border wrote to his friend Washburne:

"In regard to your suggestion that I should authorize some one to say that in no event I would consent to ever becoming a candidate after 1880, I think any statement from me would be misconstrued and would only serve as a handle for my enemies. Such a statement might well be made after the nomination, if I am nominated in such a way as to accept. It is a matter of supreme indifference to me whether I am or not. There are many persons I should prefer to have the office than myself. I cannot decline if the nomination is tendered without seeking on my part."

He came back to the United States in April, landing at New Orleans and journeying north through Southern cities amid scenes identical with those that had marked his journey across the continent from San Francisco a few months earlier. When he reached Chicago he was greeted with an immense meeting at which he was openly proclaimed a candidate for a third term, the announcement being formally made that he would accept the nomination if it came in the right way. He then went to his home in Galena and did not leave there again till after the Chicago convention had completed its work. The convention met on June 2, and when the time to make nominations arrived Senator Roscoe Conkling placed General Grant in nomination in his famous phrase: "And when they ask whence comes our candidate, we say, from Appomattox and its apple tree." Then Colonel Ingersoll nominated Mr. Blaine in a speech which is no less famous, and others put forward Senator Sherman, Elihu B. Washburne and Senator Edmunds. General Grant led on the first ballot with 304 votes; Blaine came next with 284, Sherman next with 93, Washburne next with 31 and Edmunds next with 30. The number necessary for a choice was 378. For thirty-six ballots the struggle was continued, Grant's highest number being 313 on the thirty-fifth and Blaine's being the highest on the first, falling to 257 on the thirty-fifth and to forty-two on the final ballot. Grant's vote stood at 306 on the final ballot when Garfield was nominated.

A graphic picture of General Grant's demeanor while receiving news of the balloting is given in Hamlin Garland's "Life of Grant." He made his headquarters at the office of his old staff officer, Rowley, in Galena, where the bulletins were received. When a bulletin came announcing the presentation of his name by Conkling, and saying that after the Appomattox passage the applause had lasted for several minutes, the "general betrayed no excitement, scarcely interest. A thoughtful look was on his face." When a second bulletin was read saying the "applause continues," and a third saying "all order is lost; the hall is one surging mass of humanity," the general's friends assured him that it was settled and that he would be nominated on the first ballot. He "moved uneasily in his chair and his face darkened a little." Then he rose abruptly, saying to his son: "Come, Buck, let's go home." When he got into the street he walked some distance in silence, then drew a deep sigh and said: "I am afraid I am going to be nominated." When, several days later, the news of Garfield's nomination came, General Grant said: "Garfield is a good man. I am glad of it. Good-night, gentlemen." To his intimate friends later he made this complaint: "My friends have not been honest with me. I can't afford to be defeated. They should not have placed me in nomination unless they felt perfectly sure of my success."

The most noticeable thing about the letter that Mr. Cleveland has written to the editor of the Georgia newspaper who asked him if he was "considering or would later consider making the race for the presidency on the Democratic ticket next year," is its lack of definiteness. "I can say no more," he writes, "than to assure you that at no time since the close of my last administration have I been desirous of carrying the Democratic banner for the fourth time in a presidential contest." That is quite as indefinite as General Grant's first comment in the spring of 1880: "All my life I have made my decision when the time for decision has arrived. I shall not depart from my usual course of action. I will neither accept nor decline an imaginary thing." It is interesting to observe that the Times put Mr. Cleveland on the same ground by saying: "Mr. Cleveland cannot refuse what no man can—a position to be offered him a full year hence. His letter would violate the proprieties were it more formally explicit."

In the meantime a great body of opinion is revealing itself in the Democratic party, both from Mr. Cleveland's opponents and from his friends. Mr. Bryan's ranting can be set aside as of very little account. He is so obviously a "bygone" or a "has been," and he bases his objections to Mr. Cleveland so persistently and so entirely upon the latter's sound money principles, that his views are of very little moment. Nobody can say how much following he can command in the next national Democratic convention. It requires a two-thirds vote to nominate in that body, and it is not improbable that in case Mr. Cleveland were to consent to be a candidate, Bryan could rally more than a third of the delegates against his nomination on third-term and other grounds. In the meantime, such talk as Bryan is pouring forth now has no other effect than to diminish his own following.

But Mr. Bryan is not the only Democrat who discourages the third-term idea. Mr. Vilas, who was a member of Mr. Cleveland's cabinet, says: "I am positive in my own mind that Mr. Cleveland is not a candidate for the Democratic nomination for President, nor do I know of any present contingency which would lead to his becoming a candidate." The Herald published opinions from twenty-eight members of the National Democratic Committee, seventeen of whom expressed themselves as unalterably opposed to Mr. Cleveland's nomination, eight of whom declined to commit themselves, and only three who were willing to favor it. The reasons given for opposition are twofold: First, that Mr. Cleveland is not "regular" because he failed to support his party's ticket in the last two national campaigns; second, the third-term objection. "The man is not yet born," says the Vermont committeeman, "who could or can be elected President of the United States for a third term."

Can these two reasons for objecting to Mr. Cleveland's nomination be overcome? If, in spite of them, Mr. Cleveland were to consent to allow his name to go before the convention, could he hope to command the support of two-thirds of the delegates?

The above striking parallel, drawn by the political editor of The New York Commercial Advertiser, a republican paper, cannot fail to have considerable influence in the coming presidential campaign.

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The Pure Water Discovery.

ONE OF THE MOST valuable scientific achievements of the day is the new method of purifying water by means of ozone. The discovery was made by German scientists and has already been put into successful operation at Wiesbaden, Germany, where the ozone plant sterilizes 250 cubic metres of water hourly. The cost of the process is a little less than half a cent per cubic meter, or per each 264.17 gallons. The ozone, generated by electric discharges in an apparatus composed of metal tubes, passes upward through coarse gravel contained in towers, while the water to be sterilized flows down and arrives at the bottom germless. The practical service of the invention lies in the fact that the ozone plant is cheaper than the sand filtering system generally used in city water-works, while at the same time it is far more effective. It is to be hoped that the system will be rapidly adopted by American cities. A news dispatch from Niagara Falls says:

JUST SHOWING HOW STRONG THEY ARE.—*Harper's Weekly.*

"Prof. Otto of France today made a successful demonstration of the ozone process of purifying water. It was witnessed by fifty officials of this city and Lockport. An electric current of 50,000 volts was sent through a cylinder ozonizer through which air passed, and as the air met the electrical discharges the oxygen was burned, creating ozone. This ozone was carried to the sterilizing tower by two pipes. The unpurified water entered the tower at the top, and there, in spray form, first met the ozone. As it flowed downward through fine granite it again met the ozone, completing the process. The water product was clear and quite changed. It is stated that from thirty to forty electrical horsepower will treat 6,000 tons of water a day. Later, Prof. Otto will demonstrate the process before the leading scientists of the country.

The commissioner of health in Chicago is already advocating the adoption of this method for one of the Chicago water stations. He says:

"Probably the most important feature of the week, in sanitary science and public hygiene, is the announcement made at the German chemists' congress of the complete success of the labors of Prof. Koch and his colleagues in the sterilization of water by ozone. That ozone is a powerful germicide and destroyer of organic matter has long been known, but the practical difficulty in the way of its use has been the cost of its production.

SWAPPING HORSES IN THE MIDDLE OF THE STREAM.—*Minneapolis Journal.*

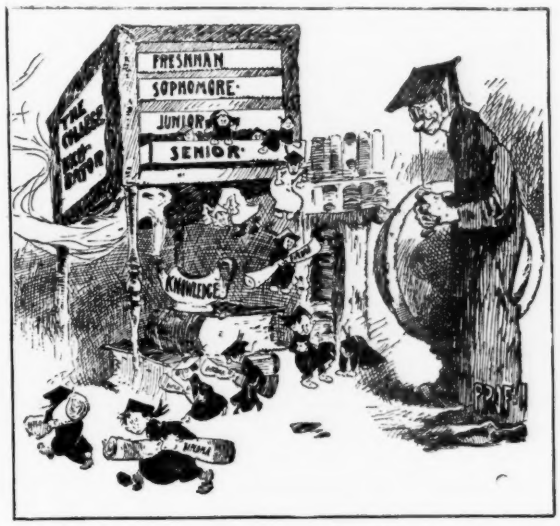
"After several months of operation the system has been pronounced a success by Dr. Proskauer at the Congress of Chemists at Berlin. The system has passed the experimental stage. The germs of typhoid fever, Asiatic cholera and dysentery are killed by ozone without fail. This is not always the case in filtration through sand or even charcoal. Furthermore, any animal or vegetable matter, particularly sewage, which might happen to be in the water in small quantity, is oxidized and destroyed. Another, though lesser, advantage is the fact that an ozonizing plant requires less space than a filtering plant of the same capacity. The cost of operation with an ozonizing plant is less than with a filtering plant. The general introduction of the ozonizing system in places where the drinking water cannot be kept free from contamination is sure to follow."

Beautifying the Cities.

SINCE IT SEEMS INEVITABLE that cities are to grow and increase with the passing years, it becomes an important problem to know how the great stretches of streets and buildings can be transformed from inharmony and ugliness into a beautiful and unified whole. Mr. Charles Mulford Robinson, who has already written a book on "The Improvement of Towns and Cities," has prepared another volume upon "Modern Civic Art," in which he gives plans and suggestions for beautifying cities, and tells what has been done in this field in both the East and the West.

His volume is a guide to past achievements and a stimulus to present endeavor. He believes a high order of civic art will be evolved from our twentieth century progressiveness, and declares the civilizations of the past when at the highest point expressed themselves in beautiful civic adornment. He says: "If

decadence has followed it, if the storied beauty of Babylon, if the splendor of Carthage as Turner painted it, if the chaste loveliness of Athens and the magnificence of Rome marked in each case the culmination of an empire, it has been through no effeminacy and weakness inherent in the development itself. * * * The adornment that was lavished upon Venice, Florence, and the minor city-republics of Italy, and again upon the Flemish cities, represented, not weakness, but the virility and rich abundance of those qualities of mind and heart which expressed themselves in the



THE COLLEGE INCUBATOR AGAIN AT WORK.—*Cleveland Plain Dealer.*

Southern and Northern Renaissance. Had the cities been less beautiful, the Renaissance had been less notable. They naturally interpret each other; and cities begin to bud and flower in beauty only when learning, culture, and art are flowering around them."

The best example of present-day ugliness can probably be found in the business districts. However, Mr. Robinson believes even this defect can be overcome by wise restrictions and legislation by city councils. Concerning the need of this section of the city he says: "We can liken the side of a street to a line of type. The letters need not be of precisely the same height, and should not be of exactly the same form and width, but glaring contrasts will shock and offend. The same would be true of a line in which colors were hopelessly jumbled. Some regularity, then, in skyline and in lines of balcony and cornice is desirable, with a harmony of tint."

Nor is harmony less needed in the residence districts. As some examples of progress he gives the following: "In England we may note, for instance, the pretty streets of Edgbarton, a suburb of Birmingham; and in the United States those that make so lovely the towns and little cities which constitute the 'metropolitan district' of Boston. From Boston, too, we may draw one example that is justly becoming widely known. This is the long suburban extension of Commonwealth Avenue, now stretching its sinuous length many miles into the country. But aside from the sinuosity of the street, a succession of lovely curves applied to an avenue of stately width and exceptionally long and elaborate surface development, this highway might well demand attention. It is a most striking illustration of a street following the natural contour of the land. It rises and falls with the gentle hills and valleys of the region through which it passes, and discloses at every turn and every changing level a new beauty."

Archaeology and the Bible.

SOONER OR LATER the statements of the Bible will be completely vindicated by the discoveries of the archaeologist's spade in Bible lands. While conversing in the home of the late Dr. T. DeWitt Talmage, he prophesied to the writer that within twenty-five years the facts of the Bible would be so thoroughly corroborated by archaeology that no one but a fool would dare to disbelieve the records. However, in the progress of confirming the authority of the Scriptures by means of pick and spade, some deductions are occasionally made from the material unearthed, which the person who makes them believes will destroy a part or all of the Bible as a divine revelation to man. Thus a furor was recently created in Germany when Prof. Delitzsch, in a lecture before the Emperor, declared the Mosaic laws were copied largely from the Assyrian laws of Hammurabi, and that it was absurd to call the Old Testament an inspired book. Such unwarranted conclusions were at once refuted by the foremost archaeologists, chief among whom was Dr. Herman V. Hilprecht of the University of Pennsylvania, who has recently issued the notable book on "Explorations In Bible Lands During the Nineteenth Century," and who was in Germany at the time this lecture was delivered. In a late number of The Sunday School Times, Dr. Hilprecht says concerning the conclusions of Dr. Delitzsch:

"In view of the fact that the cuneiform texts which played the chief role in the recent controversy on 'Babel and the Bible' belong to the period of Hammurabi, or Amraphel (Gen. 14:1), who lived about 2250 B. C., while the age to which the different parts of the Pentateuch generally are ascribed is considerably younger, it may seem pardonable that Delitzsch, as an enthusiastic Assyriologist, should have overrated the value of those inscriptions for the interpretation of the Old Testament. But it cannot be criticized sharply enough that, on the basis of certain striking parallels, doubtless existing between the language and contents of certain biblical chapters and those of certain Babylonian documents, he did not hesitate to place the Old Testament writings on a par with the literary remains of other great nations of the past, and to ridicule and undermine the foundations of the religious belief of millions of earnest Christians and Jews, by denying that an ethical monotheism was taught in the Old Testament Scriptures, and by depriving them of their real character as a revealed book of religion.

"The present writer was among the first to oppose these startling views of Delitzsch in a series of public lectures on 'the American excavations in the temple of Bel at Nippur.' They were delivered at the request of German universities and learned societies in Leipsic, Berlin, Munich, Frankfort on the Main, Jena, Erlangen, and other cities. Upon the invitation of the chief court-chaplain, Dr. Dryander, I went a second time to Berlin, to address an especially representative assembly, including half a dozen German princes and the court circles; Prussian state ministers with their councillors, and the president and members of the Council of the Evangelical Church; the provost of the university, with leading members of the four faculties; Mr. Charlemagne Tower, United States Ambassador to Germany; Admiral Holman, to whom the emperor a few days later sent his famous letter, and many other persons of rank and title who had attended Delitzsch's second lecture. It became very evident that the emperor and his councillors began to realize the importance of the movement started by Delitzsch's uncalled-for attacks against the Bible, and tried their best to get all the information possible on the points at issue.

NOT A FAIR EXCHANGE.—*Brooklyn Eagle.*

"Since then a whole literature dealing with 'Babel and the Bible' has appeared, disclosing the impossibility of Delitzsch's claims and the weakness of his principal positions, so that the minds of the people have gradually become quiet again."

FROM TELEGRAPHER TO RAILWAY MAGNATE

TO rise from the humble position of telegraph operator at a wayside station in Kentucky to a position commanding $20,000 a year on a five-year contract is the record of Edward P. Bryan, vice-president and general manager of the Interborough system of New York. Thirty-eight years ago he was sending telegraph dispatches from Lebanon, Ky. His work attracted attention and he was transferred, first to Frankfort and later to Louisville. As a comparatively young man he was superintendent of the system.

In Louisville he made his railroad reputation. There, by his work on the Louisville and Nashville, he attracted the attention of the Belmonts, who then controlled the Louisville and Nashville system, and it is through this fact that he was later chosen for his present position.

Mr. Bryan developed a genius for handling traffic at congested points, and for a time he was superintendent of the terminals at Louisville. He was appointed to this position in 1891. Here he showed his skill for handling trains and getting them rapidly out of the way of one another that first marked him as peculiarly fitted for the problem confronting the street railways of New York City.

He did his work so well that he was called to St. Louis after four years to manage the terminal company there. He was made vice-president and general manager, and he was faced with a problem which was not without its difficulties. He had charge of the great bridge over the Mississippi, which is the connecting link of all the great transcontinental lines. In four years' time he won a prominent position among the foremost men of St. Louis.

It was by a strange combination of chance and fitness that when the promoters of the colossal transit scheme, which was to unite the lines of Greater New York into a homogenous system, began to look the world over for a man capable of grappling with the tremendous problems the choice should have alighted on the Westerner managing the traffic over the big bridge at St. Louis.

The available army was tremendous. New York City teemed with men who had given the problems peculiar to the traffic in that city long study. After the field had been all looked over August Belmont said:

"I have the man."

Mr. Bryan was engaged on a five years' contract for $100,000. He was to receive $20,000 a year and more than half the term of the contract was to expire before the system he was to manage had ever run a train.

For nearly two years he has been studying, fitting himself for his duties when the subway in a few months will be opened. He has visited every subway system in operation and has gained all the ideas that may help in his work. He made a special trip abroad with Mr. Belmont, John B. McDonald, Chief Engineer Deyo and several other officials of the subway, and inspected the systems of all the leading European cities. Some idea of the magnitude of the system he is to manage may be gained from the fact that the signaling and interlocking system alone cost $1,000,000. The cars cost $2,000,000. This for the subway alone.

Mr. Bryan is ready for his new duties when they come. Already he is the busiest man in New York. His mail keeps two secretaries busy and a score of visitors are demanding his attention every hour in the day.

HAPPY LIFE OF COUNTESS TOLSTOI

THE world will probably never know the debt it owes to the wives of its famous leaders. Their triumphs are more often due to their wives than to their own genius. This is notably the case in the life of Count Leo Tolstoi, and the tribute paid by the Gentlewoman to Countess Tolstoi is well deserved. The writer says:

"The Countess Tolstoi at home, whether in her suburban Moscow home, or upon the family estate some miles distant, Yasnaya Polyana, near Tula, is a charming woman of the world, speaking, perfectly, English, French or German, as the visitor prefers, eager to discuss the latest books of Paris, London, New York or Berlin; a grande dame of the old school, dressed simply, but with exquisite taste, and wearing a few jewels which are heirlooms and of much value.

"In 1860, the present count, always an erratic man, decided he would never marry, and thereupon sold the Manor House, which was taken to pieces and set up again upon the estate of the purchaser. It was but a short time later that he met the young daughter of a Moscow physician who made him forget all his plans and resolutions. Two years later they were married, in 1862, and the count brought his bride to Yasnaya Polyana.

"She was more than twenty years younger than he, and although she spent the first seventeen years of her married life in this lonely place, living in a small building left standing after the Manor House was taken down, she was extremely happy when the Moscow house was built and she could be often in the city.

"There is an avenue of splendid old birch trees at Yasnaya Polyana to which the countess is especially partial, and the house is now a commodious and modern dwelling, so she is well contented to pass the summer months there, where dinner is spread under the trees, where there is plenty of fresh air and romping ground for her grandchildren, and where the count can have full opportunity to experiment with his socialistic doctrines. The house is simply built but comfortable, and the library is overrunning with books, as the count receives from the author or publisher almost every important book as soon as it is published. There the countess presides over a large household. Three of her children are married and often at home, then the count has generally staying with him one or two disciples who have come to him as a great teacher of religion and socialism, while seldom a week passes that some traveler from abroad does not journey there to pay his respects to the great writer and his wife.

"She has insisted in protecting her husband's health, his property and his financial interests and it is due to her that Count Tolstoi is alive today and able to give his genius to the service of the world. Countess Tolstoi has been an ideal mother to her thirteen children, eight of whom are still living.

THE KHEDIVE TRANSFORMING EGYPT

THE Khedive of Egypt, H. H. Abbas Helmy II., is not the idle monarch which popular imagination may picture him. Under the aggressive control of England, not only the monarch, but the people of Egypt, have become aroused to their opportunity and have cast off the sleep of ages. Fresh canals are being made, and side by side with these irrigating projects, others of a similar character are afoot for fertilizing waste land, for under the Khedive's inception the vast marshes of Mariout are being taken in hand to drain, making the useless rich, for even in Egypt side by side with the vast tracts of desert where water fails there are the marshes, salt and otherwise, where there is too much. Cairo and Alexandria, too, are full of proofs that Egypt is ceasing to be asleep, for European buildings are on all sides. The Khedive's palaces—the Abdin at Cairo and the Ras-el-Tin at Alexandria—are buildings showing everywhere traces of the nineteenth century, while the twentieth is already beginning to make its mark in modern hotel and dwelling house, for the European architect and builder are hard at work—often entirely in European style, but here and there with some modification or blending of the old Eastern architecture, with admirable effect in the glorious clear air by day and the glow of electric lamps by night.

One is prone to connect the East under Moslem sway with exclusive difficulty of access and even risk but it is not so here. Under the rule of Abbas Helmy, Cairo and Egypt generally are becoming the gathering places of light and learning, where all who make up the vast army of progress receive a welcome. Here the traveler, the tourist, and the man whose motto is "advance" are in the midst of probably the oldest known civilization, and yet on all sides the eye rests upon the indications of the budding and burgeoning forth of the newest and brightest features in the world of today. Slavery and the kourbash are dead, savagery has been driven back into the desert, and the bright light of modern civilization is sweeping over the beautiful land. Whether the Cape to Cairo Railway will become a fact remains to be seen, but we may take it for granted that the wire will stretch from north to south if Marconi's invention does not supersede its use. But even if battery and wire still should reign the instruments for telephonic and other messages are already waiting at Cairo.

LONG DISTANCE PHOTOGRAPHY

IN an interview Henniker Heaton, M.P., England's leading postal reformer, who recently returned from Rome, where he was entertained by Marconi, described the radiograph, the latest wonder in taking photographs at long distances. He said:

"I visited one of Marconi's radiograph stations, three miles outside of Rome, in the Campagna, and was shown there perfect photographs of a large size taken by electricians and scientists from that station of views in the mountains twenty-five miles away. How this marvel was accomplished is their secret. Whether it was done by some new ways of utilizing the Hertzian waves or an entirely new discovery, I am unable to say. The photographs were clear, bringing out in sharp definition the outline of houses and the figures of men and women as though taken only ten or twenty yards off. They appear able to extend or narrow the field at will. One of the operators told me that in a short time they hope to be able to take photographs of objects and places two hundred miles distant and enable you to see the person you are telegraphing to at that range. No one is permitted to enter the radiograph station, and, so far, the secret has been admirably kept."

LIGHT FROM THE HUMAN BODY

THAT the human body emits rays by means of which photographs can be taken has been demonstrated by experiments recently made by Professor Arthur W. Goodspeed, of the University of Pennsylvania. In making photographs by the light emanating from the human hand, Professor Goodspeed uses a method which is the reverse of that employed in X-ray work. In photographing by means of the Roentgen ray the object is placed between the photographic plate and the apparatus. In the method used by Professor Goodspeed, the plate is placed between the apparatus and the thing to be photographed.

The results, according to a writer in Harper's Weekly, are procured as follows: The ordinary X-ray apparatus is put inside a box made of wood, and impervious to ordinary light rays. On top of the box are placed a number of lead plates, in order to shut off the ordinary Roentgen ray, which has not the power to penetrate dense metals. This precaution, according to previous practice, would prevent the making of any impression whatever upon an object placed outside of the box. On top of the mass of lead plates is laid the photographic plate that is to be affected. It is enclosed in a light-proof envelope or box, so as not to be changed by the ordinary rays of sunlight which are visible to the human senses. On the photographic plate may be placed coins, metals, or any other object which it is desired to photograph.

The Crookes tube is then placed in operation, and from its kathode come forth the X-rays. The photographic plate, resting on top of the box, screened off by lead plates, is entirely unaffected by them. But let a human being put his hand in the field beside the plate for a few minutes, and afterward develop the plate. He will see that the emanations from his hand have affected it, and that there are dark spots where the metal object lay upon it: so that the photograph, exposed in a dark room at night, has been taken by the light of a human hand.

CLEVERNESS OF ANTS

DR. FLAGG tells an interesting story of some ants he had observed: "A pie was placed on a shelf in a cupboard, with a wide ring of molasses encircling the plate. The ants discovered it, and, wanting pie for breakfast, they set out to get it. They first marched about the ring, leaving an ant here and there at places which were seen to be less wide than the rest of the ring. Then they carefully selected the narrowest place; and, going to an old nail-hole in the wall, they formed an endless stream of porters, each bringing a grain of the plaster. They built a causeway through the molasses of these bits of lime, and in three hours from the time of discovery, they were eating the pie."

LARGEST EGG IN THE WORLD

A RARE and remarkable curiosity in the shape of the largest egg in the world is now on exhibition in Bird Hall of the American Museum of Natural History. The egg belonged to a gigantic extinct bird, called the aepyornis, formerly inhabiting the wilds of the Island of Madagascar. This huge member of the bird kingdom, for some unknown reason, was exterminated in comparatively recent times, and nothing but its fossil eggs and fragmentary remains of the skeleton can be found.

From the length and size of the limbs and feet the birds are said by scientists to have been probably twice or three times the height of an ostrich, of which they are supposed to be a distinct group. They were powerful and ever dangerous creatures to human life. It is related that they carried off cattle and sheep, and the white inhabitants had to walk about with tame tigers to guard and protect themselves from their attack. The extraordinary size of the egg, which is nearly a foot long by ten inches in diameter, is vividly shown by comparison with a hen's egg, which seems nothing but a mere speck in comparison.

Nearly half a hundred hen eggs could be packed inside, says the New York Commercial-Advertiser. Only a few perfect eggs have been found. They command a high price, owing to their scarcity, averaging from $100 to $500 a piece.

WHY POPCORN POPS

A LEARNED man, in a recent issue of that thoughtful publication, Science, addresses himself to a problem of the gravest nature, namely, the well-known effect of heat upon a familiar product of vegetation; that is to say, the particular variety of the chief native cereal whose grains, or particles, are characterized by a more or less translucent and horny endosperm, and the cells of which contain closely aggregated starch polygons having a central rarified area.

As the writer in Science puts it, when the temperature of the particles of any of the varieties of this cereal is increased to between 145 and 160 degrees centigrade, and so maintained for from four to ten minutes, there results a fracture of the particles from the apex and a modification of the molecular arrangement. In the case of some common varieties, the endosperm becomes more or less friable, while the contents show an increase in the quantity of dextrine and reducing sugars present. While the structural readjustments in the altered areas would seem to indicate that the fracture of the particle results from the expansion of the individual starch grains, the degree and rapidity of the expansive movement is controlled by the relative amount of water and air present. Thus, in the particular variety under discussion, the starch polygons are of such nature and construction as to facilitate expansion and render it explosive in character; there is a fracture of the particle along its two radii, the endosperm swelling very considerably, the peripheral portions cohering with the hull, but the fractured quarters turning back to meet below the embryo.

And that is why popcorn pops.

SCIENCE NOTES

A college to train Marconigraph operators has been started at Brixton, England. At present it consists of a class of about twenty students. Wireless telegraphy is of such comparatively recent birth that an installation goes out of date in about three months. The despatching and receiving instruments are set up in different rooms and a message from one to the other has to travel through twelve brick walls.

Professor Simon Newcomb is abroad in the capacity of President of the Congress of Art and Science, which meets in St. Louis in the latter part of September, 1904. He is organizing the representation of France and England at this Congress, which will be most interesting, one of its objects being to demonstrate the wonderful strides made in science and scientific art in the last hundred years. Each country will be asked to contribute its quota, and as far as possible arrange to be represented by its leading scientific men. While admitting the marvelous strides that have been made in all countries in scientific research, the Professor is of the opinion that, relatively speaking, the greatest advances during the past twenty years have been made by Italy.

Medical Problems of Our Day

PASSING OF THE FAMILY DOCTOR

PRESIDENT ANDREW SLOAN DRAPER, of the University of Illinois, has not been carried away with the trend of the times toward specialism and particularly is he opposed to turning the medical profession over body and soul to commercial greed. In an address before the graduates of the Medical department of the University of Illinois he said:

"For one I regret the apparent passing of the family doctor. I regret it not more because of inconvenience to the public and unreasonable cost to the poor than because of the unfortunate influence upon the medical profession. A great collection of doctors' offices, numbering scores or hundreds, in one building, in the business quarter of a great city must adopt the forms and beget the methods and breed the spirit of commercialism. It succeeds that system of medical specialization which in reasonable measure is well enough, but which, carried to extreme, rests upon no sufficient foundation, limits the character, growth, and professional development of the individual physician, imposes needless inconvenience and cost upon the public without compensatory advantages, and works a marked change, on both sides, in the feelings of attachment and regard between the family and the medical advisor which have been the charm and main reward of a physician's life work."

TREATING THE EYE BY ELECTRICITY

TREATMENT of diseases of the eye by electricity has been tried as long as electricity was first scientifically employed in therapeutics. Nevertheless, the advantages of this treatment are very little known. Dr. von Reuss deserves credit for referring to Prof. Mendelsohn's monthly Die Krankenpflege, in a detailed article on partly successful experience in electrical treatment of diseases of the eye, made by himself, which he strongly recommends to his colleagues. Without entering into special information chiefly intended for physicians, one point from the experience of the author has to be set forth. According to his statement, there is no doubt as to the sedative effects of electricity upon a diseased eye, particularly in cases of inflammation.

At first electricity was used in diseases of the ophthalmic nerves and muscles of the eye, but in these cases Dr. von Reuss could not secure positive results. Most remarkable, however, are the improvements observed in treatment of inflammatory diseases of the eye by electricity. A great advantage is offered by the treatment being simple and not at all disagreeable. As almost every physician with a large practice owns an induction-coil, he need purchase no new instruments. In order not to make the patient afraid of the action of the electrical current, the physician uses the faradaic hand (named after Michael Faraday.) For this purpose the physician touches with one of his hands the diseased eye, while with the other hand holds one electrode and the patient the other one of the apparatus. Except a pricking feeling in the hand which clasps the electrode, the patient does not feel anything; nevertheless, the action of the electrical current is so annoying for the physician, that he cannot continue one sitting for a longer period than three to five minutes.

The electrical current can in case of necessity be brought in direct contact with the eye by a compress tied upon the same. The patient can also in this way regulate the current according to his liking to prevent its becoming disagreeable. The whole affair, including the fixing of the electrode (compress) upon the eye, offers no difficulty, so that the patient may treat his eyes at home without the presence of the physician, which is of greatest value in cases of inflammation of the eyes where violent pains set in during the night. In nearly all cases pain disappears almost instantaneously and ceases for a long while. Dr. von Reuss recommends electrical treatment first of all in cases of iritis, corneitis, and choroiditis. The influence of electricity in removal of photophobia, which is due to a certain kind of conjunctivitis, by which the eyes cannot be opened, has been astonishing. Even upon blind eyeballs, which remain sometimes very painful, the electrical current exercises an extremely beneficent effect.

A YALE SCIENTIST ON SUICIDE

SUICIDE in the United States has been studied by Prof. William B. Bailey of Yale for a period covering the years 1897 to 1901, and the results are published in full in the Yale Review: He has taken 29,344 cases and compiled the first set of exhaustive statistics ever prepared from the viewpoint of the authority on social or political economy.

In order to have a more convenient unit 10,000 cases were taken by Prof. Bailey for computation in his statistics. Of these 7,781 were found to be males, 2,219 females, indicating that in general about three and one-half males to one female commit suicide. Taken by age the figures show the following:

Years.	Totals.	Males.	Females.
Under 20	635	339	296
20 to 30	2,261	1,592	669
30 to 40	2,381	1,831	550
40 to 50	1,874	1,593	281
50 to 60	1,316	1,122	194
60 to 70	808	725	83
70 and over	344	296	48
Unknown	381	283	98
— Totals	10,000	7,781	2,219

It is found that the number of the married suicides exceeds that of those who are single. This table shows the relative proportions:

	Total.	Males.	Females.
Single	4,054	3,120	925
Married	4,807	3,817	990
Widowed	679	496	183
Divorced	198	137	52
Unknown	271	202	69
Total	10,000	7,781	2,219

Shooting is found to be the favorite method of suicide, followed closely by poison. Almost exactly 60 per cent of the cases of suicide are included under these two heads.

Despondency is the leading motive, claiming about 20 per cent of the victims. Business loss, ill health, and insanity follow in order with about 13 per cent each, disappointment in love coming next. Suicide on account of alcoholism is seventeen times as common among the males as females, while from business loss the number is 13 to 1.

Monday is the favorite day for committing suicide, followed by Sunday closely. From Monday down to Friday there is a gradual falling off, but on Friday there is an inexplicable rise, and then a drop on Saturday, the lowest of the week.

ALCOHOL IN MEDICINES

THE Pacific Medical Journal calls attention to the fact that most bitters and tonics contain more bad whiskey than any other beverages. The temperance people condemning anyone for drinking beer or wine at meals, yet they are daily condoning stuff that is far more harmful. Light beer contains 2 per cent alcohol; light wine about 25 per cent; champagne 25 per cent and sherry and port about 40 per cent.

The approximate amount of alcohol in certain nostrums is given in the following:

Patent Medicines.	Per Cent.
Greene's Nervina	17
Hood's Sarsaparilla	19
Schenck's Sea-Weed Tonic	20
Brown's Iron Bitters	20
Kaufman's Sulphur Bitters	21
Paine's Celery Compound	21
Burdock's Blood Bitters	25
Ayer's Sarsaparilla	26
Warner's Safe Tonic Bitters	36
Parker's Tonic	42
Hostetter's Stomach Bitters	44

According to the Pacific Medical Journal, millions of dollars' worth of these deleterious "bitters," "tonics," etc., are sold yearly, and multitudes of people who are grossly ignorant of the fact that all these nostrums contain the poorest kind of cheap whiskey, or fusel oil and alcohol, secretly become drunkards, acquiring the taste for this brand of bitters or that.

IMPROMPTU SURGERY

AT Vallejo, Cal., recently, an ingenious application of electricity to surgical operations was demonstrated. An apprentice at the navy yard was severely injured by a piece of steel, which flew from a tool, embedding itself in his face. It was thought that the metal had been entirely removed from the wound, but there were indications of the presence of a foreign substance. Master Electrician Petrie arranged an electromagnet of his own design capable of lifting 500 pounds. The magnet was held directly over the orifice of the wound and the current was turned on. In an instant the piece of metal was drawn from the wound and attached itself to the magnet.

TWO TYPES OF EDUCATION

WHAT THE HIGH SCHOOL SHOULD TEACH GROWING BOYS AND GIRLS

By G. STANLEY HALL, President of Clark University

THE remarkable advances made within the last decade or two in our knowledge of adolescence are marking an epoch and are destined to radically modify our ideas of secondary and, to some extent, higher education, and in the near future to revolutionize some of the tendencies now dominant. The teens are the age of acquisition of the later and more precious stages of human development, because in them man is more radically differentiated from animals. It is precisely these, unfortunately, that may be most easily aborted in their nascent periods by a little overwork, worry, exposure, deficient food, and other causes which would not affect the earlier stages of growth. Before this period children need much drill, habituation, authority, and memory work; but as adolescence slowly supervenes and boyhood is molted, the method of freedom and appeal to interest and spontaneity should be increased. Now the best things are springing up in the human soul. If there is any genius or talent, enthusiasm for work or for ideals, they begin now to be felt. It is spring in the soul. If the race is ever to advance, it will not be by increasing average longevity or directly by enriching the last stages of life, but by prolonging this period of development so that youth shall not die out and its zest and enthusiasm grow pale.

There are two standpoints from which everything can be regarded—the logical and the genetic. One is the method of system, and the other that of evolution. One develops; the other organizes. One is more dominant in the biological and the other in the physical sciences and mathematics. One looks more at form; the other at content. In studying the soul one seeks to explore and schematize the adult mind; the other cross-sections this method and considers the psychic functions of animals, children, savages, and defectives as well. The man who is most developed himself, or in whom severe illness or conversion in a too drastic, literal sense has made some break with his past life, is most liable, without special studies, to forget that growth is the one and only test of values in the world of education in its largest sense, and that even church, home, and state, as well as school, are to be ultimately measured only by their making an environment in which man can attain an ever higher and more complete maturity. The great organizers in education, therefore, are constitutionally in danger of distrusting youth and their endeavors to be one-sidedly scholiocentric; while those whose watchword is development, and who believe in nature and seek first of all to have the warrant of her great push upward behind them are paidocentric, and hold that everything in the school—buildings, topics, and methods—were made for youth, and not vice versa.

Logic has no place for interest, and deems it, if not merely a convenient expedient, something not essential and organic; perhaps dispraises information topics or subjects, or thinks all alike educational. The latter regards knowledge not as an end, but as a means to larger living; would conserve the child in the man; holds that studies in which there is no pleasure can have only limited profit; and appeals for its sanctions to the biographies of the great leaders in the world of learning. The logical standpoint persists in the methods of drill and training proper for childhood and the stage of apprenticeship to authority; wishes to cultivate exactness and accuracy before its time; and has had much to do with the sad fact that the American high school, despite the rare opportunity that has come to it above all European systems, that its beginning marks the dawn of this critical age, has remained more oblivious and unresponsive to its nature and needs than perhaps any other institution ever devised for it. We place perhaps the most trying of examinations, of a kind that cultivate the memory pouches, just at that age when teaching should be suggestive, so as to sink deep, as if trying to cultivate the power of ruminence instead of the ulterior processes of assimilation. We make too small appeal to the imagination at the age when every youth should be an idealist, if his soul is not made sterile, and incessantly analyze to secure so-called formal discipline, just as Aristotle says the mind totalizes, wants the largest wholes and great principles, forgetting that mental, like dynamic energy, must be developed over a large surface in order to be applied at a small one, and that the prime thing at this stage is to train character, to awaken, to graft interests, to give range and loftiness of sentiment and of view, and that the Greek teacher of youth chose to be called an inspirer.

The normal boy in the middle teens is often a walking interrogation point about ether, atoms, nature of electricity, X-rays, motors of many kinds, with a special gravity of mind toward frontier questions where the great masters know as little as he. He would like to see hundreds of demonstrative experiments made in physics and the liberty to repeat most of them himself, without being bothered about mathematics. Moreover, he has a veritable passion for brief stories of great men. The hero-ology of the history of physics, if rightly applied, might generate a momentum of interest that would even take him through the modern course. He is essentially in the popular science age. He wants great wholes, facts in profusion, and very few formulae. If he has had the very rare good fortune to have all this in the home environment of perhaps the son of a professor of physics beforehand, this course would be well. But as it is interest wanes, not so much because the work is difficult, as because to a mind scantily furnished it seems dry and formal. If the course is taken to the end, there is more satiety and fatigue than hungry curiosity about it on entering college.

The whole story of physics suggests the old tale of the duck farmer who was also a chemist, whose researches showed him conclusively that one thing that would fatten the eider duck most cheaply and rapidly and give its flesh a delicacy that no epicure could resist, was celery; but when his duck farm was finished and complete he found celery to be almost the only thing that his fool ducks could never be induced to touch. So all the educational legislation and curricularization in the world will forever abort if it does not take careful heed of the interests and capacities of pupils. It was perhaps one of the most eminent physiologists of the last half century who after long study thought he could artificially digest certain foods in retorts so completely that by injecting the pure chyme of it into the aorta he could dispense with all the preliminary stages of digestion that were performed in the alimentary canal, and by thus freeing the energy so used for culture could mark a far greater epoch upward in the race than that caused by the descent or control of fire and by cooking. Fortunately, he tried his experiment first on dogs, rabbits and guinea pigs; for all died of too much richness and condensation.

The careful recent studies of truancy and runaways show that most occur in the early teens and are due to unconscious hunger caused by bad home dietaries; so I am convinced that mental mal-nutrition, thus caused at the age when the appetite for content studies is at its height, by thus offering a stone to those who cry for bread, is responsible for the rapidly decreasing numbers as we go up the grades of the high school.

The greatest need of adolescence today is another association of public and English high-school teachers, working independently of the college and in the service of the great public that supports the high school, interpreting its needs and striving to fit for life and not for college.

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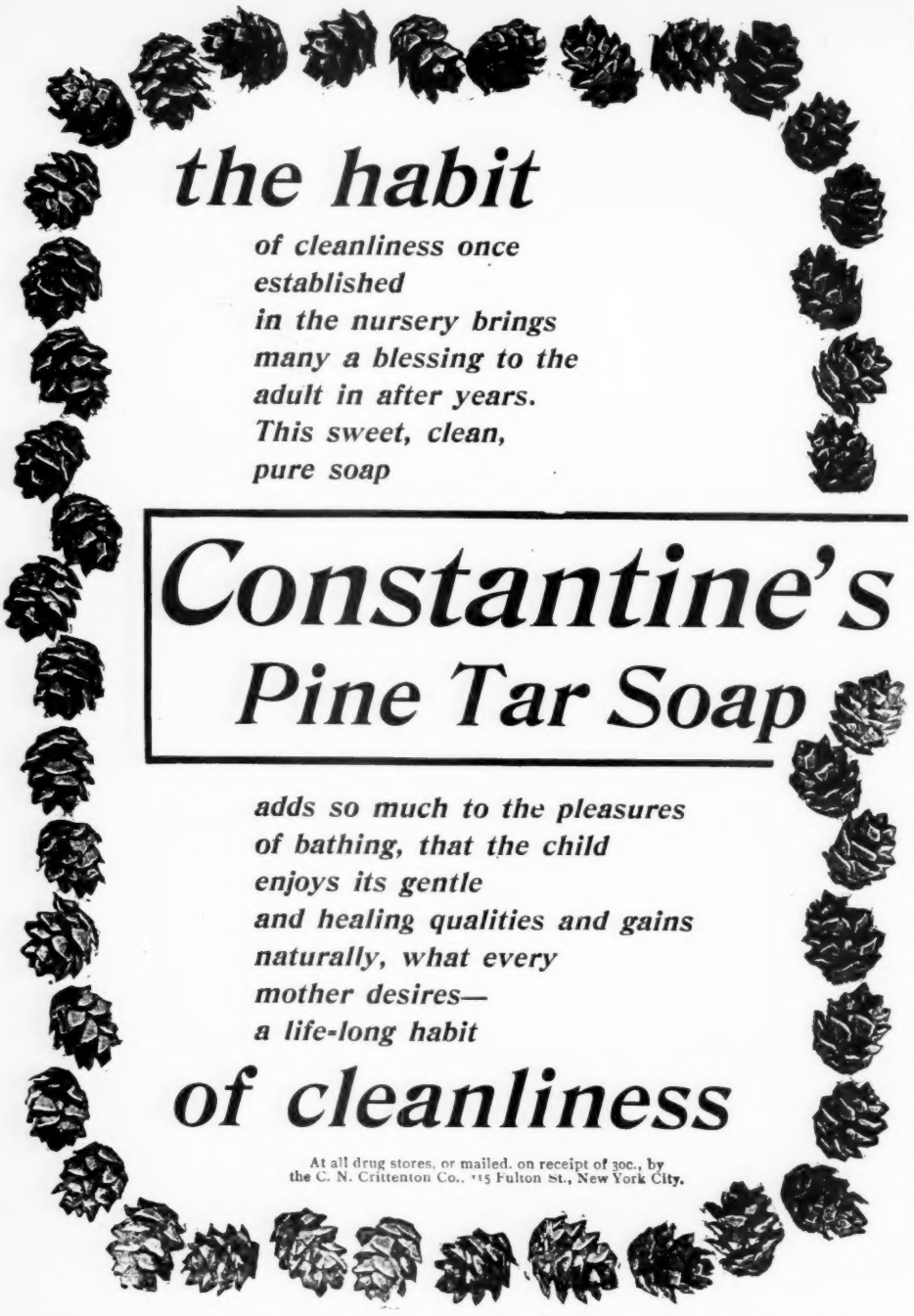
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DR. HILLIS ON DIVORCE

IN a discussion of the divorce evil and what should be done, the Rev. Newell Dwight Hillis recently said:

"Anything that injures the American family, likewise threatens American institutions. Whatever strengthens the solidity and permanence of the home makes for literature, for art, for science, for tools, for national happiness and prosperity. We must hope much for a uniform divorce law, representing all the States, and registered in the Constitution. These laws ought to stand round about the home for its safety as the mountains stand round about Jerusalem.

"The wise men who have been considering the subject explain the singular increase of divorce through the increase of wealth, the love of pleasure, the waxing of selfishness and the incoming of new peoples who mistake liberty for license. But fundamentally the root-cause is the weakening of the moral sense, the decline of the home sense, the spirit of self-sacrifice and of good will, of fidelity to conviction—the spirit of our fathers that led them to give happiness rather than get it, to lose pleasure rather than save it.

"It is so easy to secure a divorce now that young people regard marriage as a trifling episode—the incident of an hour.

"A young man and young woman at twenty-two love the same things. They do not know that at thirty they will love different and opposite things, for neither one is fully developed. The time has come for society to blot out those words, 'Love at first sight,' and substitute for them these words, 'Love for sound sense.'

"The State, that makes a young man study two years as a druggist before a license is given, that makes the young doctor and lawyer study three years before they can secure licenses, ought to ask the young man and young woman to pass an examination equally rigorous before a license is given to found an American home and set up an American family."

RUSSIA INTERFERING WITH MISSIONARIES

MR. JOHN R. MOTT, the representative of the World's Student Christian federation, who is at present on a foreign missionary tour, has recently given interesting data in Christendom concerning the Chinese province of Manchuria, to which, by reason of the aggressive attitude of Russia, and the political complications likely to result therefrom, the eyes of the world are now being directed. The area of Manchuria is three times that of Great Britain, and its population about 20,000,000. It is inhabited by a virile race, consisting of the Chinese and of the Manchus, the race which conquered China. Missionary operations were begun in 1870, by two Irish preachers. At first the natives were hostile, and the path of the missionaries was full of difficulties. In 1873 there were only three converts, in 1899 there were 19,000, and until the outbreak of the Boxer troubles, when various mission stations had to be abandoned, they were steadily increasing at the rate of about fifty per cent a year. There were at that time about sixty foreign missionaries in the field. Special attention has all along been given from the beginning to the training of native helpers. The medical work has been the means of breaking down opposition and opening a way for the gospel. The British Foreign Bible Society has co-operated with the missionaries in scattering the literature, and Christian churches are starting up all over the country. The most recent reports are to the effect that Russia has put every possible obstruction in the way of re-opening the abandoned mission stations. She has already put Manchuria under the Greek archimandrite of Peking, and has limited all Christian teaching to members of the Orthodox Greek church.

The Presbyterian General Assembly, in its report on what should be the minimum salary for a pastor decided on $800 per year, with a manse. It stated: "What constitutes an adequate support is a question the answer to which depends upon the location of churches and the circumstances of the business of the country. But whatever the conditions surrounding churches the minimum salary of pastors, in the judgment of the committee, ought to be at least $800 per annum with a manse."

Many a home missionary who is now barely eking out an existence on $300 or $400 a year and providing his own house, while he is traveling sometimes 100 miles a week to fill his engagements, would think he had found the garden of Eden with $800 and a manse.

MR. CHAMBERLAIN'S LATEST IDEA

ENGLAND is in a ferment of political excitement. The Education Bill threw the whole nation into a ferment which still continues and now Secretary Chamberlain has added to the confusion by his proposal to tax the British nation in behalf of the colonies. It is nothing more nor less than the protection policy, making the home market pay more in order to give the preference to the colonies and thus unite all together in closer sympathy.

The United States is deeply interested in the outcome of the discussion for two reasons. If Mr. Chamberlain should succeed in levying a duty on imported breadstuffs which would give a preference to England's colonies of at least one shilling per quarter over similar commodities imported from foreign countries, it would immediately stimulate wheat growing in the northwestern provinces of Canada to such an extent that we should be deprived of one of our best customers.

Another reason why we are interested in the proposal is because, if it fails to pass it may mean the annexation of Canada to the United States. Once let the Canadians learn that they have no hope of gaining any discrimination in their favor in the British market, and they are likely to abolish the preference of 33 1-3 per cent which they are now giving to British manufacturers. Moreover, they will recognize that, in seeking an imperial zollverein, they have been following a will-o'-the-wisp, and that their only chance of prosperity lies in commercial or political union with the United States. It will be remembered that Canadian Liberals formerly put commercial union with their American neighbors in the foreground of their party program, until they were encouraged to believe that they might obtain an outlet for their surplus food products in Great Britain.

WANTS AMERICANS FOR MANCHURIA

REPRESENTATIVES of Russia are now in the United States with a view to securing 1,000 young men for opening up the resources of Manchuria. One who was approached recently and sounded as to his willingness to go to Manchuria was told that it would be necessary for him to understand the rudiments of book-keeping, of ordinary merchandising, and also to have some knowledge of military tactics. It appears from this last requirement that Russia is quietly drilling and arming those native factors of Manchuria who manifest a desire to let the Slav have his own way in the north of China. It appears also that the Russian drillmasters are not as effective in their work with the natives as the American.

How well the American, fond of adventure, but more fond still of dealing with civilized races, can adapt himself to the wild conditions now existing in Manchuria is an open question. Russia is in possession there and does not mean to retreat. She is placing her traders and merchants everywhere and sustaining them whenever necessary with her army. The population to be dealt with is somewhat turbulent, and very far removed from American ideas of living.

It was estimated last fall that fully 2,000 Americans were already in the district, some for love of adventure and some through indirect connections with the Russian government. There are mines to be opened, branch railways to be built, roads to be laid, mercantile houses to be established, and much vigorous fighting in sight. The belief is quite general among the Americans already there that war is imminent, that the Eastern crisis is so near, a conflict between Russia and the other great powers can only be averted a short time.

While the eyes of the world are centered on the Balkans as the coming theatre for a great war the Americans in the East say it is to be fought in the vicinity of the Yellow Sea and that Russia will inevitably win. There would appear to be some reason for thinking that Russia herself now expects the conflict and that in taking American blood into her new possession she is only forearming herself for the bitter fight.

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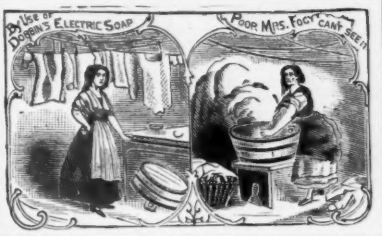

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SENATOR VEST'S TRIBUTE TO A DOG

ONE of the most eloquent tributes ever paid to a dog was delivered by Senator Vest of Missouri some years ago. He was attending court in a country town, and while waiting for the trial of a case in which he was interested was urged by the attorneys in a dog case to help out. Voluminous evidence was introduced to show that the defendant had shot the dog in malice, while other evidence went to show that the dog had attacked defendant. Vest took no part in the trial and was not disposed to speak. The attorneys, however, urged him to speak. Being thus urged, he arose, scanned the face of each juryman for a moment and said:

"Gentlemen of the jury, the best friend a man has may turn against him and become his enemy. His son or daughter that he has reared with loving care may prove ungrateful. Those who are nearest and dearest to us, those whom we trust with our happiness and our good name, may become traitors to their faith. The money that a man has he may lose. It flies away from him, perhaps when he needs it most. A man's reputation may be sacrificed in a moment of ill-considered action. The people who are prone to fall on their knees to do us honor when success is with us may be the first to throw the stone of malice when failure settles its cloud upon our heads.

"The one absolutely unselfish friend that man can have in this selfish world, the one that never deserts him, the one that never proves ungrateful or treacherous, is his dog. A man's dog stands by him in prosperity and in poverty, and in health and in sickness. He will sleep on the cold ground, where the wintry winds blow and the snow drives fiercely, if only he may be near his master's side. He will kiss the hand that has no food to offer, he will lick the wounds and sores that come in encounter with the roughness of the world. He guards the sleep of his pauper master as if he were a prince. When all other friends depart he remains. When riches take wings and reputation falls to pieces he is as constant in his love as the sun in its journey through the heavens.

"If fortune drives the master forth an outcast in the world, friendless and homeless, the faithful dog asks no higher privilege than that of accompanying him, to guard against danger, to fight against his enemies. And when the last scene of all comes, and death takes the master in its embrace and his body is laid away in the cold ground, no matter if all other friends pursue their way, there by the grave side will the noble dog be found, his head between his paws, his eyes sad, but open in alert watchfulness, faithful and true even in death."

Then Vest sat down. He had spoken in a low voice, without a gesture. He made no reference to the evidence or the merits of the case. When he finished judge and jury were wiping their eyes. The jury filed out, but soon entered with a verdict of $500 for the plaintiff, whose dog was shot, and it was said that some of the jurors wanted to hang the defendant.

NEW MONEY FOR THE FILIPINOS

FILIPINO money to the amount of $75,000,000 is now being coined at the United States Mint. The making of American dollars being for the time intermitted, 100,000 of the new pesos for the Philippine Islands pour forth daily in their stead.

The laws regulating the coinage of a new currency for the Filipino people, contained in the Acts of Congress of July 1, 1902, and March 2, 1903, were called into being by the urgent necessity for a new and stable medium which should replace the worn, depreciated silver money in circulation in the Philippines at the time of their acquisition by the United States. Following out the policy of giving the people of the islands as large a share as practicable in the direction of their own affairs, a Filipino named Figuero was chosen as the designer of the new coins. His accepted design shows on the reverse of the coin the denomination of the piece, together with the figure of a woman who holds a hammer resting on an anvil, a smoking volcano in the distance. The obverse bears the shield of the United States, the eagle with outstretched wings hovering above it; the legend reads, "U. S. of America."

The unit of the new coinage is fixed at 12.9 grains of gold, one-tenth alloy. The American dollar contains 25.8 grains, just twice as much. The silver peso, 416 grains, also nine-tenths fine, is to be issued upon an exchange which is par with the gold unit, and worth half a dollar. The half-peso, or fifty-centavo piece, weighs 208 grains. The twenty-centavo piece weighs 83.1 grains, a little less than one-fifth of the peso; the ten-centavo is of 41.55 grains. A nickel five-centavo, together with one and half centavo pieces of bronze, is also provided for. The urgent demand has made it essential that two million pesos be made in a single month. The coins are shipped, as fast as they can be completed, to the War Department at Washington, which has the responsibility for their distribution

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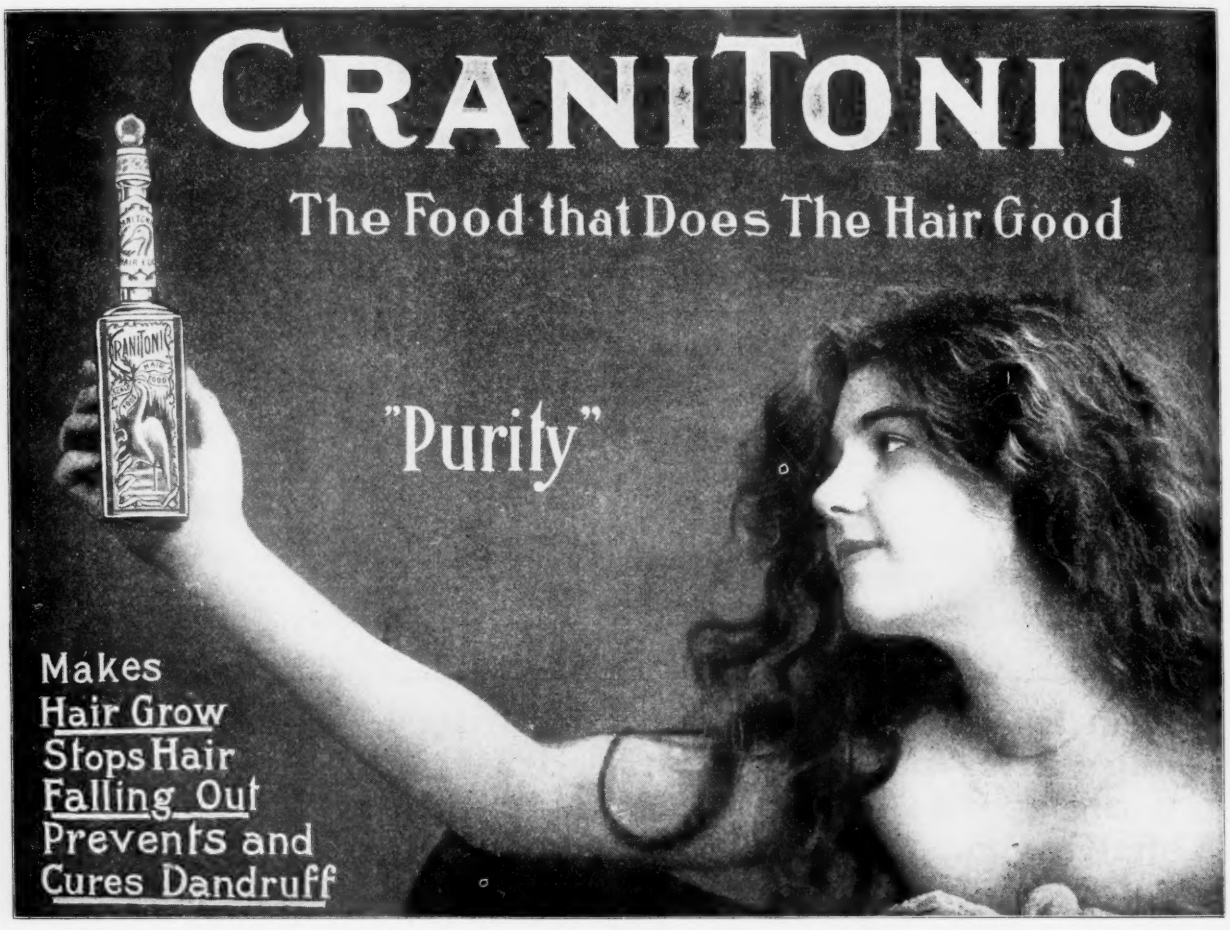

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